# THE TEMPORAL PROFILE OF (SPACE OCCUPYING LESION OF BRAIN) HEADACHE

*Dissertation submitted to*

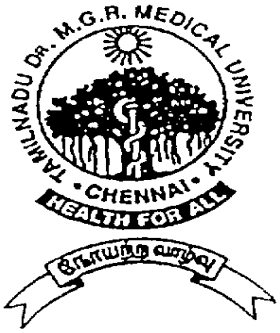
**THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY**

*In partial fulfillment of the regulations*

*for the award of the degree of*

## D.M. BRANCH - I

## NEUROLOGY




**GOVT. STANLEY MEDICAL COLLEGE & HOSPITAL**

**THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY**

**CHENNAI, INDIA**

**AUGUST 2012**

# CERTIFICATE

This is to certify that the dissertation titled **"THE TEMPORAL PROFILE OF (SPACE OCCUPYING LESION OF BRAIN) HEADACHE"** is the bonafide original work of **Dr. N. SHANMUGA SUNDARAM,** in partial fulfillment of the requirements for D.M. Branch – III (Neurology) Examination of the Tamilnadu DR. M.G.R Medical University to be held in AUGUST 2012.

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# DECLARATION

I, **Dr.N.SHANMUGA SUNDARAM,** solemnly declare that dissertation titled **"THE TEMPORAL PROFILE OF (SPACE OCCUPYING LESION OF BRAIN) HEADACHE"** is a bonafide work done by me at Government Stanley Medical College and Hospital during October 2010 to November 2011 under the guidance and supervision of my unit chief **PROF.S. GOBINATHAN M.D., D.M.(Neurology),** Professor and Head, Department of Neurology, Government Stanley Medical College and Hospital, Chennai.

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# CONTENTS

# INTRODUCTION

Headache is a leading reason for medical consultation and particularly for neurological consultation. A tremendous range of disorders can present with headaches. Given the range of disorders that are implicated in manifesting as headache, a detailed analysis and interpretation of the pattern of headache would be of immense help in distinguishing the rarer life threatening causes of secondary headaches from the more common primary headaches. Previous studies have mentioned that 86% had primary headaches that were classifiable, 11% were unclassifiable and 3% had secondary headaches [1]. Amongst the secondary headaches, this study is planned mainly to analyse the pattern of the secondary headaches due to brain neoplasm.

**Classification of Brain tumours**

Brain tumours are a diverse group of neoplasms arising from different cells within the central nervous system (CNS) or from systemic tumours that have metastasized to the CNS. Brain tumours include a number of histologic types with markedly different tumour growth rates.

They are broadly classified into primary and secondary metastatic tumours

(I) Primary neuroepithelial tumours:

- Diffuse astrocytoma( Fibrillary, gemistocytic , protoplasmic), anaplastic asrocytoma, Circumscrined astrocytoms
- Glioblastoma
- Oligodendroglioma
- Ependymoma, subependymoma, myxopapillary ependymoma
- Choroid plexus tumours
- Primitive neuroectodermal tumours
- Mesangial/ extraxial:
- Meningiomas ( including atypical and anaplastic)
- Heamangiopericytomas
- Nerve sheath tumours:

  Schwanomas

  Neurofibromas
- Miscellaneous tumours:

  CNS lymphomas

  Germcell tumours

  Heamangioblastomas

  Craniopharyngiomas

  Epidermoid and colloid cysts

(II) Metastatic tumours.

## MECHANISM OF HEADACHE

Headache arises from activation of pain-sensitive intracranial structures. In the 1930s, Ray and Wolfe [2,] identified intracranial components were pain-sensitive and mapped the pattern of pain referral based on studies in which various intracranial structures were stimulated during intracranial surgery performed during local anesthesia.

The brain parenchyma is insensitive to pain. The intracranial pain-sensitive structures include the arteries of the circle of Willis and the first few centimeters of their medium-sized branches, meningeal (dural) arteries, large veins and dural venous sinuses, and portions of the dura near blood vessel including the tentorium and the diaphragma sellae. Pain-sensitive structures that are external to the skull cavity include the external carotid artery and its branches, periosteum of the skull, scalp and neck muscles, skin and cutaneous nerves, cervical nerves and nerve roots, mucosa of sinuses, and teeth. Pain from these structures is carried by cranial nerves (CN) V, VII, IX, and X. [2,3].

Inflammation, traction, compression, malignant infiltration, and other disturbances of pain-sensitive structures lead to headache. Superficial structures tend to refer pain locally, whereas deeper-seated lesions may refer pain imprecisely. Within the cranial vault, nociceptive

signals reach the central nervous system (CNS) largely by way of the first division of the trigeminal nerve (CN V), and therefore an occipital lobe tumour may refer pain to the frontal head region. Infratentorial lesions tend to refer pain posteriorly because this compartment is innervated by the second and third cervical nerve roots, which also supply the back of the head. However, posterior lesions or cervical spine pathological conditions may also produce frontal headache, because the caudal portion of the trigeminal nucleus extends down as far as the dorsal horn at the C3 level. Impulses arriving from C2 to C3 converge on neurons within the trigeminal nucleus and may refer pain to the somatic distribution of CN VI.

Afferent pain impulses into the trigeminal nucleus are modulated by descending facilitatory and inhibitory input from brainstem structures, including the periaqueductal gray matter, rostral ventromedial medulla, locus ceruleus, and dorsal raphe nuclei. Opioids diminish pain perception by activating the inhibitory systems, whereas fear, anxiety, and overuse of analgesics may activate the facilitatory systems, thereby aggravating pain.

Traction on the large blood vessels and dura as well as direct compression of cranial and cervical nerve fibers by the tumour itself are

the likely mechanisms for headaches attributed to brain tumours[2,3]. Tumours and other mass lesions can cause headache by direct pressure on any of the above structures. Pain arising from the intracranial cavity is a form of visceral pain, and therefore referred to more superficial structures; it is not perceived as coming directly from the compressed region. In general, unilateral lesions refer pain ipsilaterally, supratentorial lesions refer pain to the frontal regions, and posterior fossa masses refer pain to the occiput[4.] However, these associations have poor localizing value. As an example, in a study that evaluated 37 patients with infratentorial tumours, 73 percent of patients had headache in the frontal, temporal, and/or parietal regions, while nuchal and occipital pain occurred in only 27 percent [11].

Acute or severe headache from a brain tumour can potentially be caused by elevated intracranial pressure resulting from hydrocephalus, mass effect of the tumour itself, or hemorrhage into or around the tumour [5]. A tumour can distort or displace structures distant from its locale, resulting in referred pain that does not correspond with its location. In such cases of "distant traction," elevated intracranial pressure may be the cause of the headache[6]. However, the relationship between elevated intracranial pressure and headache in brain tumour remains uncertain [7].

Headache is initially seen in about 20 percent of patients with brain tumour, and headache occurs during the course of the disease in about 48 to 60 percent[12,13]. A history of pre-existing headache is a probable risk factor for headache associated with brain tumour[12] , though this may apply only to a longstanding primary headache history and not to a remote history[13].

The prevalence of intracranial neoplasm is exceedingly low in patients with headache without neurological signs [14]. But the prevalence of intracranial involvement is relatively high in patients with known systemic malignancy [23].

The features of brain tumour headache are generally nonspecific and vary widely with tumour location, size, and rate of growth [5,13,14] .The headache is usually bilateral, but can be on the side of the tumour [15] . Supratentorial tumours impinging on structures innervated by the ophthalmic division of the trigeminal nerve may produce a frontotemporal headache, while posterior fossa tumours compressing the glossopharyngeal and vagus nerves can cause occipitonuchal pain. There is generally little radiation, except in posterior fossa tumours. Nausea and/or vomiting accompany the headache in 40 to 60 percent of adult

patients [11,12]. Headache exacerbation with Valsalva, change in position, or exertion occurs in a substantial minority of patients.

Although headache is commonly seen with brain tumour, it is rarely seen as an isolated symptom. In most cases, it is associated with other neurologic symptoms such as seizures or focal weakness during the course if not at the onset. Among adults, only 2 to 16 percent of patients with brain tumour present with headache alone [9,12,19,28] . Isolated headache of more than 10 weeks duration is seldom caused by brain tumour [19]. Tumour-related headaches tend to be worse at night and may awaken the patient. This nocturnal pattern is thought to be due in part to transient increases in PCO2, a potent vasodilator, during sleep. Other possible physiologic explanations include recumbency and decreased cerebral venous return. The classic "brain tumour triad," comprising nocturnal or early morning occurrence, nausea/vomiting, and severe nature, has not been borne out as a typical pattern in modern studies.

Tumour location and pathology play a role in the presentation of the headache. Primary brain tumours and metastatic tumours are equally likely to cause headache[12,20]. In general, slow-growing supratentorial tumours, such as low-grade gliomas, cause headache less frequently than tumours with more rapid growth. With slower-growing tumours, seizures

are more common than headaches[21]. Meningiomas are usually slowly progressive, and cause headaches significantly less often than gliomas. Headache occurs in approximately one-third of patients with supratentorial meningiomas[12, 15]. The meninges may also be involved in diffuse tumour infiltration (leptomeningeal carcinomatosis), which results in a generalized headache.

Tumours in the posterior fossa, such as medulloblastomas and ependymomas, cause headache in 60 to 83 percent of patients, and earlier in the clinical course than supratentorial ones [20,30]. Guillamo etal [31] in a study of brainstem gliomas, excluding ependymomas, found only 44 percent of patients with headache . The posterior fossa, location seems to be a more important determinant of headache than tumour type, as posterior fossa lesions tend to obstruct cerebrospinal fluid pathways early and lead to increased intracranial pressure [4]. Headache is the presenting symptom of posterior fossa tumours in most cases, with the notable exception of cerebellopontine angle tumours. Most are vestibular schwannomas, which usually present with hearing loss or tinnitus before the onset of headache.

Sellar and parasellar tumours in adults do not commonly present with headache, despite the sensitivity of the diaphragma sellae to pain[27].

Primary lesions in sellar area arise predominantly from the pituitary, the optic nerve and hypothalamus, the meninges and surrounding mesenchymal structures. These commonly are pituitary adenomas and craniopharyngiomas, presenting with visual or endocrine symptoms. Nevertheless, headache is a common accompaniment of pituitary tumours [33]. Headaches are classically retro-orbital or bifrontal or frontotemporal. They tend to be worse on waking. Sudden catastrophic headaches may result from pituitary apoplexy. Very large pituitary tumours and craniopharygiomas may cause obstruction of CSF, resulting in hydrocephalus. Levy et al [17] in his study with pituitary tumours, stated the headache was seen in 70 percent, but there was no relationship between headache features and pituitary volume and the presenting phenotype is likely to be governed by a combination of factors, including tumour activity, relationship to the cavernous sinus and patient predisposition to headache[17].

The clinical manifestations of ventricular tumours depend on the tumour size and location, and only when the tumour blocking the circulation of cerebrospinal fluid pathway, or when the tumour encroaches around the brain tissue, produces corresponding symptoms and signs, such as intracranial hypertension and lesions.

The common symptoms of lateral cerebral ventricle Tumour include Intracranial hypertension (headache), positioning signs, Mental disorders, papilledema and seizures.

When the intra ventricular tumour is small or when the cycling of cerebrospinal fluid is maintained, the patient may be completely without any apparent symptoms. Cerebrospinal fluid circulation is affected when obstacles (holes between rooms blocked some intraventricular obstruction) to flow happens, producing intracranial hypertension which is clinically manifested as a headache. Headache is the first symptom for most patients, according to data in order to headache symptoms as the first lateral ventricle tumours account for about 92.5% of patients. They mostly have paroxysmal headache, intermittent or paroxysmal increase. When the room between the holes or intraventricular part of (the next corner or angle) when the blockage caused by obstructive hydrocephalus, due to the rapid expansion of the ventricle, causes unbearable headache with severe nausea and vomiting. This sudden increase in intracranial pressure may lead to coma or even death due to herniation. Tumour in the side of the indoor activities have a certain degree, offen showed sudden valve-like obstruction of cerebrospinal fluid circulation pathway, resulting in acute increase of intracranial pressure, resulting in headache. When the body or head position changes causing lifting of

intraventricular obstruction, the patient can quickly stop the headache. Such as re-obstruction, then the recurrence of headaches, such attacks could be repeated many times. Therefore a small number of patients experience attacks from time to time before the amount of flexion was hit or prone position.

Colloid cysts of the third ventricle are benign tumours that may cause brief, severe headache reflecting blockage of the cerebrospinal fluid pathway by the tumour in a ball-valve mechanism, worsened or relieved by changes in position[33]. Third ventricular ependymomas are rare tumours. The presenting symptoms included headache, ataxia, vertigo, Parinaud's syndrome and obstructive hydrocephalus [34] .

Cavernoma is a vascular abnormality of the central nervous system. It consists of a cluster of abnormal, dilated vessels. Cavernomas can be found in any region of the brain. Headaches may be a heralding symptom in cavernous malformation. 6-10% of patients with a cavernoma will report headaches as an accompanying symptom. Up to 25% of patients will present with a hemorrhage. The headache starts suddenly and may be followed by nausea, neurological problems or a decreasing level of consciousness. Sometimes a bleed may be very small and produce very mild or no symptoms at all.

Brain metastases are the most common intracranial tumours in adults, accounting for significantly more than one-half of brain tumours. In patients with systemic malignancies, brain metastases occur in 10 to 30 percent of adults and 6 to 10 percent of children [35]. The incidence of brain metastases may be increasing, due to both improved detection of small metastases by magnetic resonance imaging (MRI) and better control of extracerebral disease resulting from improved systemic therapy.

In adults, the most common primary tumours responsible for brain metastases are carcinomas, and include lung, breast, kidney, and colorectal cancers, and melanoma. In contrast, carcinomas of the prostate, esophagus, and oropharynx and non-melanoma skin cancers rarely metastasize to the brain.

This was illustrated in two large series, one from the Metropolitan Detroit Cancer Surveillance System and the other from a Dutch series [36]. The incidence of brain metastases detected was :

- Lung — 16 to 20 percent
- Melanoma — 7 percent
- Renal cell cancer — 7 to 10 percent
- Breast cancer — 5 percent
- Colorectal cancer — 1 to 2 percent

The most common mechanism of metastasis to the brain is by hematogenous spread [37] .Metastases are usually located directly at the

junction of the gray matter and white matter where blood vessels decrease in diameter and act as a trap for clumps of tumour cells . Brain metastases also tend to be more common at the terminal "watershed areas" of arterial circulation. The distribution of metastases roughly follows the relative weight and blood flow in each area [38] :

- Cerebral hemispheres — approximately 80 percent
- Cerebellum — 15 percent
- Brainstem — 5 percent

Different primary tumours may have a predilection for metastasis to different areas within the brain. For example, pelvic (prostatic and uterine) and gastrointestinal tumours more commonly metastasize to the posterior fossa [38], while metastases of small cell carcinoma of the lung are equally distributed in all regions of the brain. The reasons for these differences are unclear but may be due to cell surface properties of the metastatic cells and the endothelium within the central nervous system (CNS) vasculature.

Headaches occur in approximately 40 to 50 percent of patients with brain metastases. The frequency is higher when multiple lesions are present or a metastasis is located in the posterior fossa. Headache was present in 48 percent and equally affected those with primary and metastatic tumours [12].

# AIM OF THE STUDY

This study is aimed to analyse the clinical profile of secondary headache in patients with brain tumour.

# REVIEW OF LITERATURE

A secondary headache in patients with a brain tumour is defined in The International Classification of Headache Disorders (ICHD-II) (1) in subchapter 7.4.

As per the criteria of International headache society,IHS 2004 2nd edition.[8]

If a new headache occurs for the first time in close temporal relationship to another disorder that is known cause of headache this headache is coded according to the causative disorder as a secondary headache. When a pre-existing headache is made worse in close temporal relation to another disorder that is a known cause of headache both the types are a possibility. Factors that support secondary headache are very close temporal relation to the causative disorder, worsening of the pre-existing chronic headache, causative factor capable of aggravating headache, improvement or disappearance of headache after management of causative disorder.

The last criteria for secondary headache requires that headache greatly improves or resolves within a specific period after relief from the causative disorder.

Persistance of headache beyond a period of 3 months after occurrence, remission or cure of the causative disorder could be named chronic headache attributable to the disorder.

The International classification of Headache disorders has coded headache with brain tumours as follows

IHS 7.4 , WHO (G44.82)

**(A) Headache attributable to intracranial neoplasm**

Diagnositc criteria:

A. Headache with atleast one of the following characteristics and fulfilling criteria C and D

1.progressive

2. localised

3. worse in the morning

4.agravated by coughing or bending forward.

B. Intracranial neoplasm shown by imaging

C. Haedache develops in temporal( and spatial ) relationship to the neoplasm.

D. Headache resolves within 7 days after surgical removal or volume reduction of the neoplasm or treatment with steroids.

**(B) For headache attributed to carcinomatous meningitis, diagnostic criteria are the following :**

A) Diffuse or localized headache fulfilling criterion C

B) Carcinomatous meningitis proven by (repeated) cerebrospinal fluid examination and/or dural enhancement on MRI

C) Headache develops and/or deteriorates with advancing disease; however, the headache may improve temporarily with intrathecal chemotherapy or glucocorticoid treatment.

**(C) For headache attributed to hypothalamic or pituitary hyper- or hyposecretion, diagnostic criteria are as follows :**

A) Bilateral, frontotemporal and/or retro-orbital headache fulfilling criteria C and D

B) At least one of the following:

1. Prolactin, growth hormone and adrenocorticotropic hormone hypersecretion associated with microadenomas <10mm in diameter
2. Disorder of temperature regulation, abnormal emotional state, altered thirst and appetite and change in level of consciousness associated with hypothalamic tumour

C) Headache develops during endocrine abnormality

D) Headache resolves within three months after surgical resection or specific and effective medical therapy.

**(D) For headache attributed to increased intracranial pressure or hydrocephalus caused by neoplasm,** the following diagnostic criteria apply :

A) Diffuse non-pulsating headache with at least one of the following characteristics and fulfilling criteria C and D:

Associated with nausea and/or vomiting

1. Worsened by physical activity and/or manoeuvres known to increase intracranial pressure (such as Valsalva manoeuvre, coughing or sneezing)

2. Occurring in attack-like episodes (Onset of headache can be sudden (thunderclap headache) and, in such cases, associated with loss of consciousness)

B) Space-occupying intracranial tumour demonstrated by CT or MRI and causing hydrocephalus (eg, colloid cyst of the third ventricle)

C) Headache develops and/or deteriorates in close temporal relation to the hydrocephalus

D) Headache improves within seven days after surgical removal or volume reduction of tumour.

In studies of unselected tumours, headache prevalence ranges from 48% to 71% (Forsyth and Posner 1993 [12] ; Pfund et al 1999 [11]; Davies and Clarke 2004 [28] ; Schankin et al 2007 [9]; Valentinis et al 2010[13]). The

prevalence has remained relatively constant despite changes in neuroimaging techniques and greater availability. Headache was reported in only 33% of children in a meta-analysis of later papers from 1991 to 2005 reporting signs and symptoms of childhood brain tumours at presentation (Childhood Brain Tumour Consortium 1991 [16] ).

Headache pain ranges from a dull ache to a pressure or tightening or a throbbing or shooting pain (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]; Schankin et al 2007 [9]; Valentinis et al 2010 [13]).

The headache pain is usually intermittent, moderate to severe in intensity, and progressive (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]; Schankin et al 92007; Valentinis et al 2010 [13]).

Only about a third of patients have nocturnal or morning headaches or both, and 20% report headache exacerbation by Valsalva maneuvers (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]; Valentinis et al 2010 [13]).

Nausea and vomiting are reported in 18% to 60% of patients (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]; Schankin et al 2007 [9] ; Valentinis et al 2010 [13]).

Headaches with features of primary headache disorders are found in a minority of patients. Migraine-type headaches are reported in up to

15%, and these usually have atypical features (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]; Schankin et al 2007 [9]; Valentinis et al 2010 [13]). Tension-type headaches were seen in 29% to 39% of patients (Schankin et al 2007 [9]; Valentinis et al 2010 [13]).

Children are more likely than adults to have nocturnal headache or headache on awakening. Nausea and vomiting are also more common in children than in adults, reported in 72% of children with supratentorial tumours and 86% with infratentorial tumours (Childhood Brain Tumour Consortium 1991 [16]).

Isolated headache with no other symptoms may be the first manifestation of a brain tumour, but it is unusual for patients not to develop other symptoms by diagnosis. In adults, only 2% to 8% of patients have isolated headache on presentation, and in 1 study of 183 patients, all patients had developed other symptoms within 10 weeks (Vazquez-Barquero et al 1994 [19]; Schankin et al 2007 [9]; Valentinis et al 2010 [13]). A study of 3,291 children with brain tumours found that less than 1% had headache as their sole symptom and less than 3% had no neurologic abnormality on examination (Childhood Brain Tumour Consortium 1991). In 2006, Wilne and colleagues reported that 41% of

200 children with brain tumours had headache at presentation, and all 200 children had other symptoms and signs (Wilne et al 2006).

Headache lateralization does not always predict tumour location. Pfund and colleagues have mentioned that headache lateralization predicted tumour location in only one third of patients, and 12% of patients with unilateral headaches had a contralateral tumour (Pfund et al 1999 [11]). In contrast, Forsyth and colleagues had stated that all patients with unilateral headache had an ipsilateral tumour (Forsyth and Posner 1993 [12]). Frontal headaches were the most unreliable in predicting tumour location and were most common (Forsyth and Posner 1993 [12]; Valentinis et al 2010 [13]). The reported frequency of bilateral headaches ranged from 18% to 72%. Generalized headache may result from increased intracranial pressure (ICP), which can arise either from a large mass or from restriction of cerebrospinal fluid outflow causing hydrocephalus. (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]).

The majority of patients with infratentorial tumours have supratentorial headaches only; but if occipital pain is present, an infratentorial tumour is more likely. Skull-based tumours were more often associated with frontal headache (Pfund et al 1999 [11] ; Schankin et al 2007 [9;] Valentinis et al 2010 [13]).

The prevalence of headache varied with tumour location: intraventricular and midline tumours (92% to 95% had headache), infratentorial tumours (70% to 84%), and supratentorial tumours (55% to 60%) ; Childhood Brain Tumour Consortium [16] 1991; Pfund et al 1999 [11;]).

Factors that predict increased risk of headache in patients with brain tumour other than location include raised intracranial pressure, degree of midline shift, and increasing edema (Forsyth and Posner 1993 12; Pfund et al 1999 [11]). The relationship between tumour size and the likelihood of headache is uncertain. (Forsyth and Posner et al[12] ). Valentinis et al 2010 [13] have stated that within similar pathologies, increased size was associated with increased risk of headache, but others studies (Pfund et al 1999 [11]; Levy et al 2004b [17]; Schankin et al 2007 [9];) have not shown this association. The headache of brain tumour associated headache worsens as the tumour grows [14].

A prior history of headaches also predicts an increased risk of headache with a brain tumour (Forsyth and Posner 1993 [12] ; Valentinis et al 2010 [13]). Schankin et al 2007 [9] reported that an alteration of headache in 82.5% of patients with preexisting headache.

Forty-nine percent of patients with headaches and pituitary tumours had a family history of a headache disorder (Levy et al 2005 [17]).

Uncommon headache syndromes can occur as a symptom of brain tumours. Headache is reported in 72% of pituitary tumours (Levy et al 2004b [17]). Trigeminal autonomic cephalgias (TACS) are reported more frequently than expected. In a case series of 84 patients, 76% had chronic or episodic migraine, 5% had short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT), 4% had cluster headache, 1% had hemicrania continua, and 27% had primary stabbing headache (Levy et al 2005 [17]).

Patients with prolactinomas and growth hormone-secreting tumours are reported to have more severe headaches than patients with non secreting tumours (Levy et al 2004b [17]).

Paroxysmal and positional headaches. Harris described severe paroxysmal headache relieved by changes in head position as the classic presentation of a colloid cyst (Harris 1944). These benign tumours are of interest, as they may present with headache not associated with other symptoms and be unrecognized. Patients still die from colloid cysts when they present with catastrophic acute deterioration due to blockage of the foramen of Munroe by the pedunculated tumour. In a study of 78

symptomatic patients with newly diagnosed colloid cysts, 25 patients (32%) presented with acute deterioration, and 5 of these died. Four additional patients presented with sudden unexplained death caused by a colloid cyst for an overall mortality of 12% (de Witt Hamer et al 2002 [38]). In a study of 105 cases of colloid cysts, the classic description of the associated headache was uncommon, as 92% of patients reported generalized, intermittent headache, and only 2 patients had a postural component (Desai et al 2002). Papilledema was found in 76% of patients, and ataxia, decreased vision, and urinary incontinence were present in 18% to 27%.

Pituitary apoplexy caused by infarction or hemorrhage into a pituitary tumour presents with acute onset of intense headache associated with visual loss plus or minus ocular palsies, facial numbness, or somnolence and pituitary insufficiency (Biousse et al 2001 [39] ; Elsasser Imboden et al 2005 [40]). Four of 42 patients (9.5%) with asymptomatic, nonfunctioning, pituitary adenomas developed apoplexy over a 5-year observation period .

Tumour cysts may rupture, spilling their contents into the cerebrospinal fluid. Craniopharyngioma, dermoid, and epidermoid cyst ruptures have all been reported to cause headache due to the

inflammatory meningeal reaction caused by the irritating cyst contents [41] The inflammation may be severe enough to cause death.

Forsyth and Posner et al 1993 had mentioned that Headaches were present in 48%, equally for primary and metastatic brain tumours. Unlike true tension-type headaches, brain tumour headaches were worse with bending over in 32%, and nausea or vomiting was present in 40% of patients. The “classic” early morning brain tumour headache is uncommon. The phenotypes of brain tumour headache is inconsistent. In a series of 111 patients with primary and metastatic brain tumours, 53 had headache attributed to the brain tumour . The headache related to brain tumour was described as similar to tension-type headache in 41 patients (77 percent), similar to migraine (although with atypical features) in five patients (9 percent), and was unclassifiable in seven patients (13 percent).

Pfund et al 1999 [11] had mentioned that 69% had headache and 31 % did not have headache. In the headache group the most frequent findings were metastatic brain tumours and different astrocytomas. Hypophysis adenomas and glioblastoma multiforme were frequent in the no-headache group.

Schankin et al 2007[9] in his prospective study of 85 patients with brain tumour-associated headache found that tension-type headache criteria were met in nearly 40 percent .

Valentinis et al 2010 [13] in his prospective study of 98 patients with tumour associated headache noted that it was not possible to classify the headache phenotype as a primary headache syndrome for more than one-half of the cases. In those that could be classified, the most common syndromes were episodic tension-type headache and episodic migraine without aura.

A new or changed headache experienced by a patient with a known systemic malignancy should be investigated. One study reported intracranial metastases in 32.4% of 68 patients (Christiaans et al 2002) [13]. Emesis, headache duration of less than 10 weeks, and non-tension-type headache pain were independent predictors of metastases but had low specificity (Christiaans et al 2002) [13]. Argyriou et al [24] reported on 54 patients with new or changed headache, 54% of whom had intracranial metastases. In their series, emesis, bilateral frontotemporal headache, pulsating quality, moderate-to-severe intensity, duration of 8 weeks or longer, gait instability, and extensor plantar responses were independent predictors of brain metastases.

# MATERIALS AND METHODS

## Objective

This study is aimed to analyse the clinical profile of secondary headache in patients with brain tumour.

## Materials and methods

An observational study to analyse the headache pattern in patients diagnosed to have brain tumour.

**Sample size :** Patients in outpatient and inpatient of Neuro medicine and Neurosurgery Departments from August 2010 to December 2011.

**Study population**: Patients diagnosed to have primary or secondary brain tumour by neuroimaging.

**Exclusion criteria:** Secondary headache due to Infections (eg, granulomas, abscess, encephalitis, meningitis, subdural empyema), Hemorrhage (intracerebral, subdural, subarachnoid), Arterial and venous thrombosis, chiari malformations, extracranial and systemic causes.

**Place:** Govt Stanley Medical college Hospital.

All patients were interviewed about their personal details

Any history of preexisting headache, if change in pattern and quality of headache,

Current headache whether present or absent, if present,

How long was the duration of the headache ,

Frequency – continuous, daily, >15/month, thrice weekly, twice weekly, once weekly, less than weekly), location (which side and whether frontal, temporal, parietal, ocipital, hemispheric Frontoparietal, to start with and during progression whether it becomes bilateral generalilsed during the episode or does it remain strictly unilateral), intensity [on a nominal analogue scale (NAS) from 1 to 10 with 1 for little and 10 for worst pain], quality of pain (dull, stinging, pulsating, tightening or band like, other), duration of the event (<1 h, 1–4 h, 4 h-24 h,24 hrs to 3 days, 3–7 days, >7 days, no data), associated phenomenon during the episode- Nausea and vomiting. Photophobia, phonophobia, lacrimation,

Any worsening with coughing, exercise , bending down, Any early morning worse headache with awakening, Any features of raised intracranial pressure, Any focal neurological findings associated since the onset of headache, Any seizures associated since the onset of headache, Whether requiring medications for relieving headache.

The nature of the neoplasm was obtained

(1)By Neuro imaging with regard to

Tumour size -Tumour size was defined as the product of the two largest dimensions (in cm) and was used as a measure to differentiate small (<10 cm2), medium (10–20 cm2) and large tumours(>20 cm2). Multifocal tumours were assigned to a special category. The surrounding oedema was estimated subjectively on a scale of 0–3, from no oedema (0) to extensive oedema (3). The main location of the tumour was chosen from the following list: frontal, temporal, parietal, occipital, hemispheric-frontoparietal, temporoparietal or infratentorial, sellar ventricular.

(2)By histopathology Statistical analysis was done using Statistical analysis was performed using SPSS package 15.

# RESULTS

208 patients with brain neoplasm either primary or secondary were analysed. The results are as follows

| | Frequency | Percent |
|---|---|---|
| Male | 109 | 52.4 |
| Female | 99 | 47.6 |
| Total | 208 | 100.0 |

The study population consisted of 52.4%, males and 47.6% females whose age ranged between 13 years to 85 years with mean age 40.99.

| | HA present | Percent | HA absent | Percent |
|---|---|---|---|---|
| Male | 98 | 47.11 | 11 | 5.29 |
| Female | 86 | 46.35 | 13 | 6.25 |
| Total | | 88.46 | | 11.54 |

Among this patients having brain neoplasm , 88.5 % ( 47.11% males and 46.35% females) had headache since the beginning or during the course of illness. 11.5 % ( 5.29% males and 6.25% females) did not have headache during the course of illness till the time of interview.

**Location of the tumour:**

| Location | Frequency | Percent |
|---|---|---|
| Frontal | 45 | 21.6 |
| Frontoparietal | 13 | 6.3 |
| Parietal | 46 | 22.1 |
| Temporal | 12 | 5.8 |
| Occipital | 3 | 1.4 |
| Cp angle | 50 | 24.0 |
| Ventricular | 17 | 8.2 |
| Sellar | 12 | 5.8 |
| Multiple | 2 | 1.0 |
| Thalamic | 3 | 1.4 |
| Pineal | 5 | 2.4 |
| Total | 208 | 100.0 |

| Location | Frequency | Percent |
|---|---|---|
| ST | 148 | 71.2 |
| IT | 60 | 28.8 |
| Total | 208 | 100.0 |

The location of tumours were Frontal (21.6%), paritetal(22.1%), temporal(5.1%), Occipital( 1.4%), CP angle( 25%), Ventriclular( 8.2%), Sellar( 5.8% ), Thalamic ( 1.4%), Pineal( 2.4%), Multiple( 1%).71.2% were in the supratentorial compartment and 28.8 were in the infratentorial compartment.

**Type of tumour**

Of these, 27.9 % were gliomas (including glioblastomas, astrocytomas, oligo dendrogliomas) , 26.4% were meningiomas, 3.4 % were pitutary macroadenomas, 0.5 craniopharyngiomas, 13.5% schwanomas more commonly in cer ebelloppontine angle, 3.8% were ependymomas, 9% were cyst (epidermoid, arachnoid and colloid cyst),3.4% were cerebellar haemangioblastomas, 1.9% were cavernomas, 4.8% were space occupying lesions unclassified (biopsy not done), and 5.3% were secondary metastatic from elsewhere in the body.

**Headache present and absent group:**

| Type of tumour in HA present group | No. | % | Type of tumour in HA absent group | No. | % |
|---|---|---|---|---|---|
| Glioma | 57 | 30.9 | Glioma | 1 | 4.2 |
| Meningioma | 55 | 29.8 | Meningioma | 0 | 0 |
| Macroadenoma | 5 | 2.7 | Pitutary Macroadenoma | 3 | 12.5 |
| Schwanoma | 15 | 8.1 | Schwanoma | 13 | 54.2 |
| Ependymoma | 8 | 4.3 | Ependymoma | 0 | 0 |
| Cyst( epidermoid, araachnoid, colloid cyst) | 17 | 9.2 | Cyst( epidermoid, araachnoid, colloid cyst) | 2 | 8.3 |
| SOL unclassified | 9 | 4.8 | SOL unclassified | 1 | 4.2 |
| Secondary | 8 | 4.3 | Secondary | 3 | 12.5 |
| Heamangioblastoma | 7 | 3.8 | Heamangioblastoma | 0 | 0 |
| Cavernoma | 3 | 1.6 | Cavernoma | 1 | 4.2 |
| Total | 184 | 100.0 | Total | 24 | 100.0 |

Gliomas ( 30.9%)and meningiomas( 29.8%) were common in the headache group. In the headache absent group , 54.2 % were CP angle vestibular schwanoms, 12.5% each were pitutary adenomas and secondary metastatic tumours, 4.2 % each were of glioma and cavernoma.

| **Prexisting headache** | **Frequency** | **Percent** |
|---|---|---|
| Yes | 8 | 3.8 |
| No | 200 | 96.2 |
| Total | 208 | 100.0 |
| Prexisting headache and family history: | | |

| **Family history** | **Frequency** | **Percent** |
|---|---|---|
| Yes | 2 | 1.0 |
| No | 206 | 99.0 |
| Total | 208 | 100.0 |
| Only 1% had positive family history. | | |

| Changed pattern | Frequency | Duration | Onset location | quality | intensity |
|---|---|---|---|---|---|
| Changed | 6(75%) | 7(87.5%) | 1(12.5%) | 7(87.5%) | 2(25%) |
| same | 2(25%) | 1(12.5%) | 7(87.5%) | 1(12.5%) | 6(75%) |
| Total | 8 | 8 | 8 | 8 | 8 |

1 % had positive family history. 8 patients (3.8%) had pre existing headache and had a change in the some form of the pattern of headache. The frequency of episodes increased in 6 remained same in 2, duration of episode was increased in 7 remained same in 1.Headache onset location had changed in 1, remained same in 7. All of them had noted change in the quality of headache recent past .The intensity increased in 2, remained same in 6.

**Duration of Headache**

| Duration of headache | Frequency | Percent | Valid Percent |
|---|---|---|---|
| 0 | 24 | 11.5 | |
| 1 | 11 | 5.3 | 5.9 |
| 2 | 27 | 13.0 | 14.7 |
| 3 | 44 | 21.2 | 23.9 |
| 4 | 41 | 19.7 | 22.2 |
| 5 | 30 | 14.4 | 16.3 |
| 6 | 28 | 13.5 | 15.2 |
| 7 | 3 | 1.4 | 1.6 |
| Total | 208 | 100.0 | 100.0 |

The overall duration ranged between 1 month to 7 months. Most had duration around 3-4 months.

**Pattern of Headache:**

Almost all of 184 patients had a intermittent pattern of headache.

**Frequency of Episodes of Headache:**

| Frequency | Frequency | Percent | Valid Percent |
|---|---|---|---|
| 4 | 1 | .5 | .5 |
| 8 | 28 | 13.5 | 15.2 |
| 10 | 1 | .5 | .5 |
| 12 | 98 | 47.1 | 53.3 |
| 16 | 28 | 13.5 | 15.2 |
| 20 | 1 | .5 | .5 |
| 30 | 27 | 13.0 | 14.7 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

In general, 15.2% had 8 episodes per month. 53.3% had frequency of 12 per month (3 episodes per week).15.2% had 16 per month ( 4 days per week). 14.7% had daily headache.

**Duration of Episode:**

| Duration ( in hrs) | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Upto 4 | 1 | .5 | .5 |
| 5-24 | 156 | 75.0 | 84.8 |
| Above 24 | 27 | 13.0 | 14.7 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

Most of the patients, 84.8% had headache duration ranging between 5- 24 hours.0.5% had headache duration less than 4 hours. 14.7 % had headache duration more than 24 hours.

**Location of headache during onset:**

| | **Frequency** | **Percent** | **Valid Percent** | **Cumulative Percent** |
|---|---|---|---|---|
| Left | 95 | 45.7 | 51.6 | 51.6 |
| Bilateral | 39 | 18.8 | 21.2 | 72.8 |
| Right | 50 | 24.0 | 27.2 | 100.0 |
| Total | 184 | 88.5 | 100.0 | |
| No HA | 24 | 11.5 | | |
| | 208 | 100.0 | | |

| Location | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Frontoparietal | 138 | 66.3 | 75.0 |
| Occipital | 46 | 22.1 | 25.0 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

During onset, Headaches were localized to frontoparietal of the side of tumour in supratentorial tumours, and bifronto parietal in sellar tumours and in hydrocephalus cases, bi occipital in infratentorial tumours. Regarding side of onset 51.6% had onset in left side ipsilateral to the tumour, 27.2 % had to right side ipsilateral to the tumour, 21.2 % had bilateral headaches

**Progression of headache:**

| **Progression** | **Frequency** | **Percent** | **Valid Percent** |
|---|---|---|---|
| Generalised | 179 | 86.1 | 97.3 |
| Unilateral | 5 | 2.4 | 2.7 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

97.3 % had progressed within half to one hour to become generalized. 2.7% had remained unilateral during the entire episode.

**Quality of headache:**

| Quality | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Dull aching | 179 | 86.1 | 97.3 |
| Bandlike | 5 | 2.4 | 2.7 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

97.3% reported that the headache was of dull aching quality and 2.7% had reported of having bandlike sensation over the head.

**Intensity of headache:**

| Intensity | Frequency | Percent | Valid Percent |
|---|---|---|---|
| 3 | 4 | 1.9 | 2.2 |
| 4 | 13 | 6.3 | 7.1 |
| 5 | 39 | 18.8 | 21.2 |
| 6 | 91 | 43.8 | 49.5 |
| 7 | 35 | 16.8 | 19.0 |
| 8 | 2 | 1.0 | 1.1 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

49.5% had Nominal analouge scaling intensity of 6. 21.2% had intensity of 5 and 19% had intensity scaling of 7. Only 1 % had intensity scaling of 8. 7.1% had intensity scaling of 4 and 1.9 % had intensity scaling of 3.

**Associated Nausea and vomiting**

| Associated vomitting | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Yes | 57 | 27.4 | 31.0 |
| No | 127 | 61.1 | 69.0 |
| Total | 184 | 88.5 | 100.0 |
| NO HA | 24 | 11.5 | |
| | 208 | 100.0 | |

In 31 % of the patient headache was associated with nausea and vomiting. 69% did not have associated vomiting.

**Associated photophobia, phonophobia, lacrimation**

None of the patients 184 patients had photophobia, phonophobia lacrimation associated with the headache.

**Associated with worsening during cough:**

| Associated cough | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Yes | 79 | 38.0 | 42.9 |
| No | 105 | 50.5 | 57.1 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

42.9% of patients reported that they had headache worsening during coughing.

**Associated with early morning headache:**

| Associated early more HA | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Yes | 19 | 9.1 | 10.3 | 10.3 |
| No | 165 | 79.3 | 89.7 | 100.0 |
| Total | 184 | 88.5 | 100.0 | |
| No HA | 24 | 11.5 | | |
| | 208 | 100.0 | | |

Only 10.3 % had early morning headache while awakening from sleep.

**Asssociated worsening during exercise , bending down:**

| Bending down | Frequency | Percent | Valid Percent |
|---|---|---|---|
| None | 154 | 74.0 | 83.7 |
| Bending | 30 | 14.4 | 16.3 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

| Strain, exercise | Frequency | Percent | Valid Percent |
|---|---|---|---|
| Yes | 22 | 10.6 | 12.0 |
| No | 162 | 77.9 | 88.0 |
| Total | 184 | 88.5 | 100.0 |
| No HA | 24 | 11.5 | |
| | 208 | 100.0 | |

12% had worsening of headache during exercise and 16.3 % had worsening of headache during bending down.

**ICT features:**

| ICT in HA group | Freq. | % | Valid Percent |
|---|---|---|---|
| Yes | 89 | 42.8 | 48.3 |
| No | 65 | 35.3 | 51.7 |
| No HA | 24 | 11.5 | |
| Total | 208 | 100.0 | |

| ICT in No HA group | Freq. | % | Valid Percent |
|---|---|---|---|
| Yes | 0 | 0 | 0 |
| No | 24 | 24 | 100 |
| Total | 24 | 100.0 | |
| | | | |

42.8 % had features of raised intra cranial tension. All the patients in the Headache absent group with tumour did not have ICT.

**Associated Focal neurological deficits:**

| Associated FND | Freq. | % | Valid percent in HA present |
|---|---|---|---|
| Yes | 80 | 38.5 | 40.76 |
| No | 128 | 61.5 | |
| Total | 208 | 100.0 | |

| Associated FND | percent in HA present | percent in HA absent |
|---|---|---|
| Yes | 75(93.8%) | 5(6.3%) |
| No | 127(99.2) | 1(0.8) |
| | | |

About 38.5% had FND. In that 40.76 % had headches associated with focal neurological signs like hemiparesis, hemisensory impairement, ataxia cranial nerve palsies, memory impairement, behavior and personality change, etc.

**Seizures:**

| Associated Seizure | Freq. | % | Valid percent in HA present |
|---|---|---|---|
| Yes | 43 | 20.6 | 23.3 |
| No | 165 | 79.4 | |
| Total | 208 | | |

| Seozire | percent in HA present | percent in HA absent |
|---|---|---|
| Yes | 42(97.7%) | 1(2.3%) |
| No | 160(97%) | 5(3%) |
| | | |

20.6 % of 208 patients had seizure. In that 23.3% had headaches associated with seizures ( focal, focal with generalization, generalized) .

**Isolated headache:**

| Isolated headache | Frequency | Valid Percent |
|---|---|---|
| Yes | 33 | 17.95 |
| Total | 184 | |
| No HA | 24 | |

Isolated headache as the symptom was observed in 30 % of the patients having headache.

**Haeadache relieving medication requirement:**

All patients(100%) required headache relieving medication in the form of analagesics or in some patients steroids for reducing tumour associated edema.

**Tumour size:**

| Tumour size | Frequency | Percent |
|---|---|---|
| Small | 146 | 70.2 |
| Medium | 59 | 28.4 |
| Large | 3 | 1.4 |
| Total | 208 | 100.0 |

Regarding tumour size it was 70.2% small in size (<10 $cm^2$). 28.4% were of medium size(10-20 $cm^2$), 1.4 % had of large size (>20 $cm^2$).

**Tumour associated edema:**

| Tumour associated edema | Frequency | Percent |
|---|---|---|
| Nil | 127 | 61.1 |
| Mild | 25 | 12.0 |
| Moderate | 47 | 22.6 |
| Severe | 9 | 4.3 |
| Total | 208 | 100.0 |

There was no edema in 61.1% of cases. 12% had mild edema, 22.6% had moderate edema, 4.3% had severe edema.

Location of headache during onset to side of the tumour:

**Chi-Square Tests**

| Side of Headache | | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|---|
| Left | Pearson Chi-Square | 80.412(a) | 18 | .000 |
| | Likelihood Ratio | 35.196 | 18 | .009 |
| | Linear-by-Linear Association | 12.094 | 1 | .001 |
| | N of Valid Cases | 95 | | |
| Bilateral | Pearson Chi-Square | 46.312(b) | 10 | .000 |
| | Likelihood Ratio | 52.200 | 10 | .000 |
| | Linear-by-Linear Association | .026 | 1 | .871 |
| | N of Valid Cases | 39 | | |
| Right | Pearson Chi-Square | 6.055(c) | 6 | .417 |
| | Likelihood Ratio | 4.814 | 6 | .568 |
| | Linear-by-Linear Association | .077 | 1 | .782 |
| | N of Valid Cases | 50 | | |

In patients with tumours in the supratentorial hemispheric region in frontal, parietal , temporal or occipital lobe, the headache was initially localized to the tumour side during onset and later became generalized. In midline tumourslike pitutaty tumours headche was bi frontoparietal. In ventricular tumours and in other infra temporal tumours with associated hydrocephalus and ICT it was bi frontoparietal during onset. In infratentorial tumours it was in occipital region during onset.

**Duration of tumour with respect to location:**

| Duration of headache | Supratentorial | Infratentorial |
|---|---|---|
| 0 | | |
| 1 | 5.4% | 5.0% |
| 2 | 12.2% | 15.0% |
| 3 | 23.0% | 16.7% |
| 4 | 20.9% | 16.7% |
| 5 | 15.5% | 11.7% |
| 6 | 15.5% | 8.3% |
| 7 | 1.4% | 1.7% |
| Total | 100% | 100.0% |

More supratentorial tumours had headache of relatively longer duration than infratentorial loacation. This association is stasitically significant ( p value 0.018)

**Intracranial tension with the location of the tumour:**

| ICT | | ST/IT | | Total | P value |
|---|---|---|---|---|---|
| | | ST | IT | | 0.398 |
| Yes | Count | 62 | 27 | 89 | |
| | % within ICT | 69.7% | 30.3% | 100.0% | |
| | % within ST/IT | 41.9% | 45.0% | 42.8% | |
| No | Count | 86 | 33 | 119 | |
| | % within ICT | 72.3% | 27.7% | 100.0% | |
| | % within ST/IT | 58.1% | 55.0% | 57.2% | |
| Total | Count | 148 | 60 | 208 | |
| | % within ICT | 71.2% | 28.8% | 100.0% | |
| | % within ST/IT | 100.0% | 100.0% | 100.0% | |

Among patients with ICT 41.9 % were of supratentorial and 45% were of infratentorial implying more of infratentorial tumours present

with raised ICP group. This association was not statistically significant (p value 0.4).

## Type of tumour and intensity of headache:

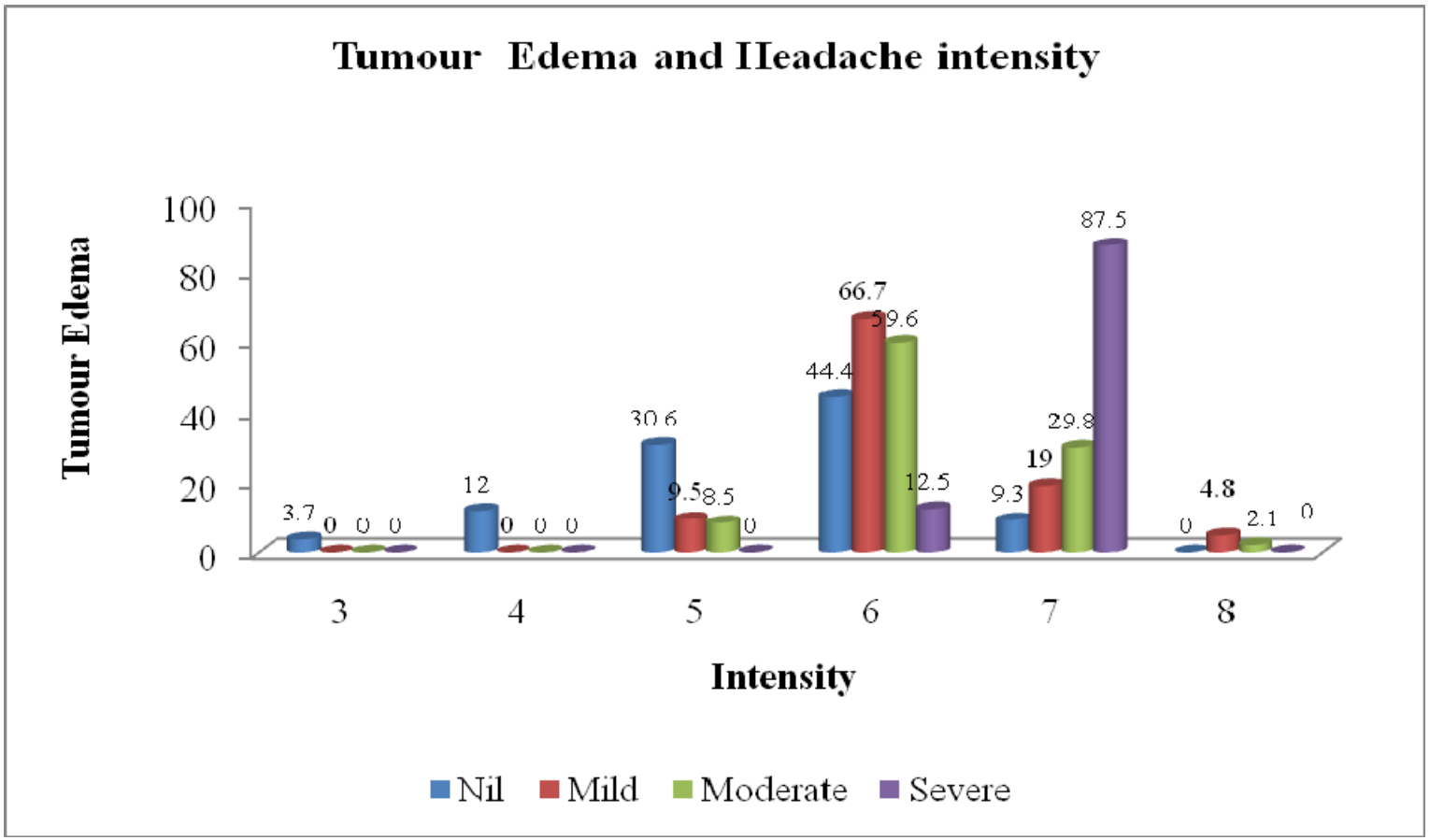
| | | intensity | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | 3 | 4 | 5 | 6 | 7 | 8 | |
| Glioma | Count | 0 | 1 | 4 | 30 | 21 | 1 | 57 |
| | % within Type | .0% | 1.8% | 7.0% | 52.6% | 36.8% | 1.8% | 100.0% |
| | % within Intt. | .0% | 7.7% | 10.3% | 33.0% | 60.0% | 50.0% | 31.0% |
| Meningioma | Count | 1 | 3 | 21 | 25 | 5 | 0 | 55 |
| | % within Type | 1.8% | 5.5% | 38.2% | 45.5% | 9.1% | .0% | 100.0% |
| | % within Intt. | 25.0 % | 23.1% | 53.8% | 27.5% | 14.3% | .0% | 29.9% |
| Macroadenoma | Count | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| | % within Type | .0% | .0% | .0% | 100.0% | .0% | .0% | 100.0% |
| | % within Intt. | .0% | .0% | .0% | 5.5% | .0% | .0% | 2.7% |
| Schwanoma | Count | 1 | 5 | 8 | 1 | 0 | 0 | 15 |
| | % within Type | 6.7% | 33.3% | 53.3% | 6.7% | .0% | .0% | 100.0% |
| | % within Intt. | 25.0 % | 38.5% | 20.5% | 1.1% | .0% | .0% | 8.2% |
| Ependymoma | Count | 0 | 0 | 1 | 4 | 2 | 1 | 8 |
| | % within Type | .0% | .0% | 12.5% | 50.0% | 25.0% | 12.5% | 100.0% |
| | % within Intt. | .0% | .0% | 2.6% | 4.4% | 5.7% | 50.0% | 4.3% |
| Cyst | Count | 1 | 2 | 3 | 8 | 3 | 0 | 17 |
| | % within Type | 5.9% | 11.8% | 17.6% | 47.1% | 17.6% | .0% | 100.0% |
| | % within Intt. | 25.0 % | 15.4% | 7.7% | 8.8% | 8.6% | .0% | 9.2% |
| SOL unclassified | Count | 0 | 0 | 2 | 6 | 1 | 0 | 9 |
| | % within Type | .0% | .0% | 22.2% | 66.7% | 11.1% | .0% | 100.0% |
| | % within Intt. | .0% | .0% | 5.1% | 6.6% | 2.9% | .0% | 4.9% |
| Secondary | Count | 0 | 0 | 0 | 6 | 2 | 0 | 8 |
| | % within Type | .0% | .0% | .0% | 75.0% | 25.0% | .0% | 100.0% |
| | % within Intt. | .0% | .0% | .0% | 6.6% | 5.7% | .0% | 4.3% |
| Heamangioblastoma | Count | 0 | 0 | 0 | 6 | 1 | 0 | 7 |
| | % within Type | .0% | .0% | .0% | 85.7% | 14.3% | .0% | 100.0% |
| | % within Intt. | .0% | .0% | .0% | 6.6% | 2.9% | .0% | 3.8% |
| Cavernoma | Count | 1 | 2 | 0 | 0 | 0 | 0 | 3 |
| | % within Type | 33.3 % | 66.7% | .0% | .0% | .0% | .0% | 100.0% |
| | % within Intt. | 25.0 % | 15.4% | .0% | .0% | .0% | .0% | 1.6% |
| Total | Total | 4 | 13 | 39 | 91 | 35 | 2 | 184 |
| | | 2.2% | 7.1% | 21.2% | 49.5% | 19.0% | 1.1% | 100.0% |
| | | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

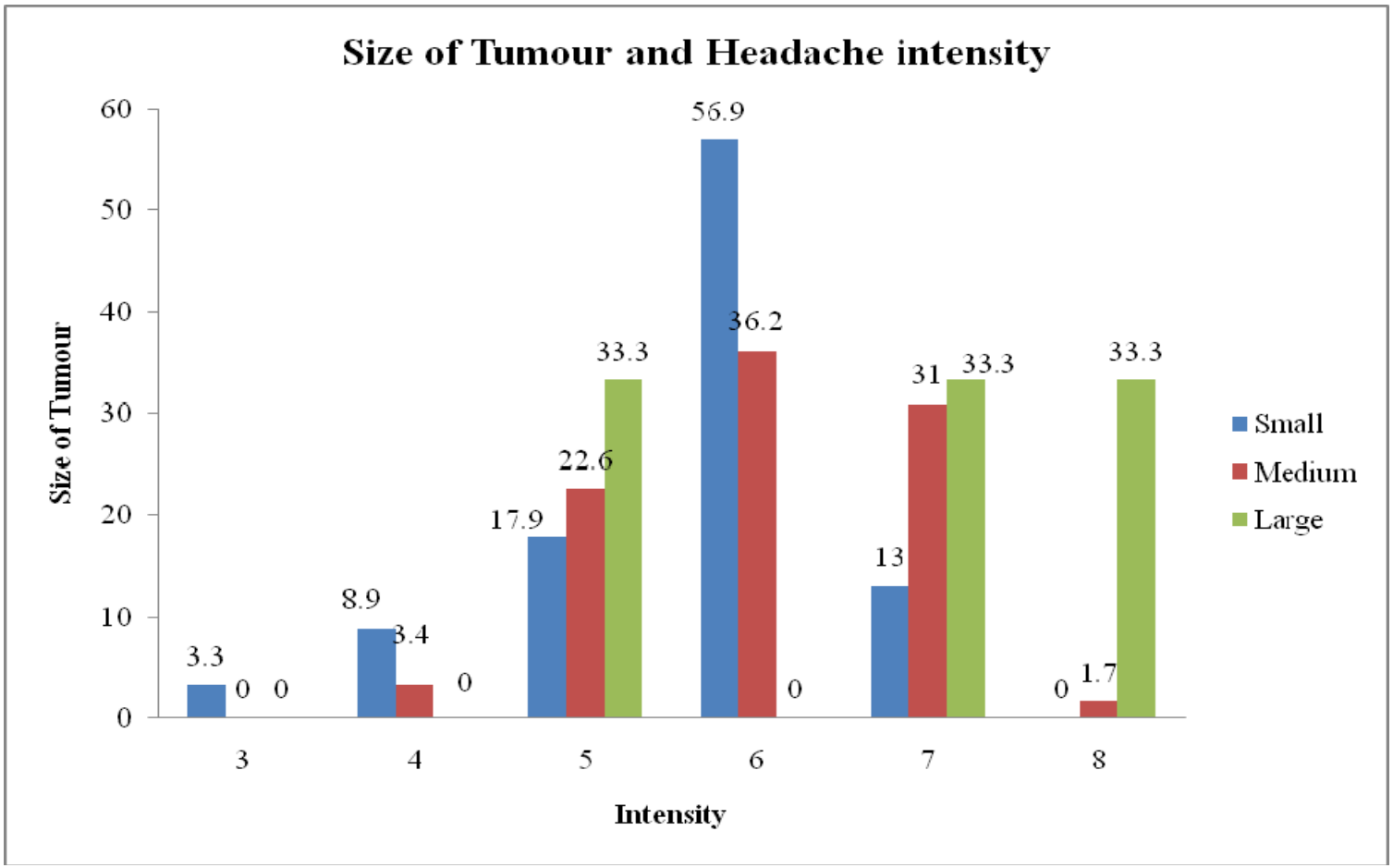
The more intense headaches are seen with gliomas, meningioma, and ventricular tumours that has caused raised intracranial pressure. The relation is statistically significantco ( p value 0.000).

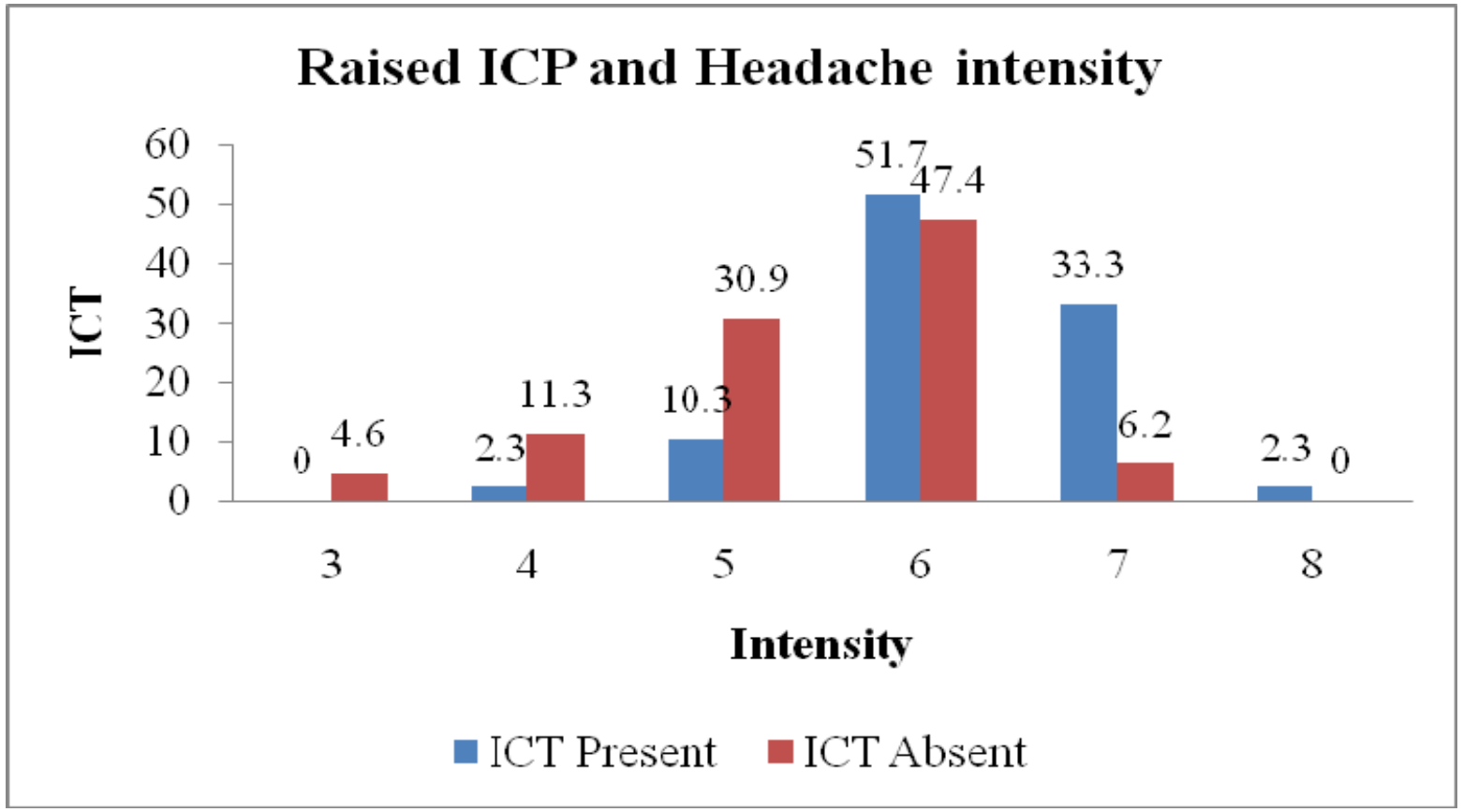
**Size of the tumour and intensity:**

| Size | | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|
| | Count | 4 | 11 | 22 | 70 | 16 | 0 | 123 |
| Small | % within Size | 3.3% | 8.9% | 17.9% | 56.9% | 13.0% | .0% | 100.0% |
| | % within intensit | 100.0% | 84.6% | 56.4% | 76.9% | 45.7% | .0% | 66.8% |
| | Count | 0 | 2 | 16 | 21 | 18 | 1 | 58 |
| Medium | % within Size | .0% | 3.4% | 27.6% | 36.2% | 31.0% | 1.7% | 100.0% |
| | % within intensit | .0% | 15.4% | 41.0% | 23.1% | 51.4% | 50.0% | 31.5% |
| | Count | 0 | 0 | 1 | 0 | 1 | 1 | 3 |
| Large | % within Size | .0% | .0% | 33.3% | .0% | 33.3% | 33.3% | 100.0% |
| | % within intensit | .0% | .0% | 2.6% | .0% | 2.9% | 50.0% | 1.6% |
| | Count | 4 | 13 | 39 | 91 | 35 | 2 | 184 |
| | % within Size | 2.2% | 7.1% | 21.2% | 49.5% | 19.0% | 1.1% | 100.0% |
| | % within intensit | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

More of medium and Large size tumours have produced more intense headache. Small tumours have produced milder forms of headache. But small sized tumours have also produced more intense headaches .The intensity of the headache association with the size of the tumour is significant (p=0.000).


Tumour Edema and IIeadache intensity
Tumour Edema
100
80
60
40
20
0
3.7
0
0
0
12
0
0
0
30.6
9.5
8.5
0
44.4
66.7
59.6
12.5
9.3
19
29.8
87.5
0
4.8
2.1
0
3
4
5
6
7
8
Intensity
Nil
Mild
Moderate
Severe


Size of Tumour and Headache intensity
Size of Tumour
60
50
40
30
20
10
0
3.3
0
0
8.9
3.4
0
17.9
22.6
33.3
56.9
36.2
0
13
31
33.3
0
1.7
33.3
3
4
5
6
7
8
Intensity
Small
Medium
Large


Raised ICP and Headache intensity
ICT
60
50
40
30
20
10
0
0
4.6
2.3
11.3
10.3
30.9
51.7
47.4
33.3
6.2
2.3
0
3
4
5
6
7
8
Intensity
ICT Present
ICT Absent

**Edema and intensity:**

| | | intensity | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | 3 | 4 | 5 | 6 | 7 | 8 | |
| Nil | Count | 4 | 13 | 33 | 48 | 10 | 0 | 108 |
| | % within Edema | 3.7% | 12.0% | 30.6% | 44.4% | 9.3% | .0% | 100.0% |
| | % within intensity | 100.0% | 100.0% | 84.6% | 52.7% | 28.6% | .0% | 58.7% |
| Mild | Count | 0 | 0 | 2 | 14 | 4 | 1 | 21 |
| | % within Edema | .0% | .0% | 9.5% | 66.7% | 19.0% | 4.8% | 100.0% |
| | % within intensity | .0% | .0% | 5.1% | 15.4% | 11.4% | 50.0% | 11.4% |
| Moderate | Count | 0 | 0 | 4 | 28 | 14 | 1 | 47 |
| | % within Edema | .0% | .0% | 8.5% | 59.6% | 29.8% | 2.1% | 100.0% |
| | % within intensity | .0% | .0% | 10.3% | 30.8% | 40.0% | 50.0% | 25.5% |
| Severe | Count | 0 | 0 | 0 | 1 | 7 | 0 | 8 |
| | % within Edema | .0% | .0% | .0% | 12.5% | 87.5% | .0% | 100.0% |
| | % within intensity | .0% | .0% | .0% | 1.1% | 20.0% | .0% | 4.3% |
| | Count | 4 | 13 | 39 | 91 | 35 | 2 | 184 |
| | % within Edema | 2.2% | 7.1% | 21.2% | 49.5% | 19.0% | 1.1% | 100.0% |
| | % within intensity | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

90 % of mild , 92% of moderate and 100 % of severe edema patients had more intense (intensity scaling of 6 and more ) headaches than patients with no edema ( 53%). More of no edema group(47 %) were associated with milder intensity headaches. But milder and no edema group were also associated with more intense headaches. The intensity of the headache correlates with the size of the tumour which is significant (p=0.000)

**Intensity and ICT:**

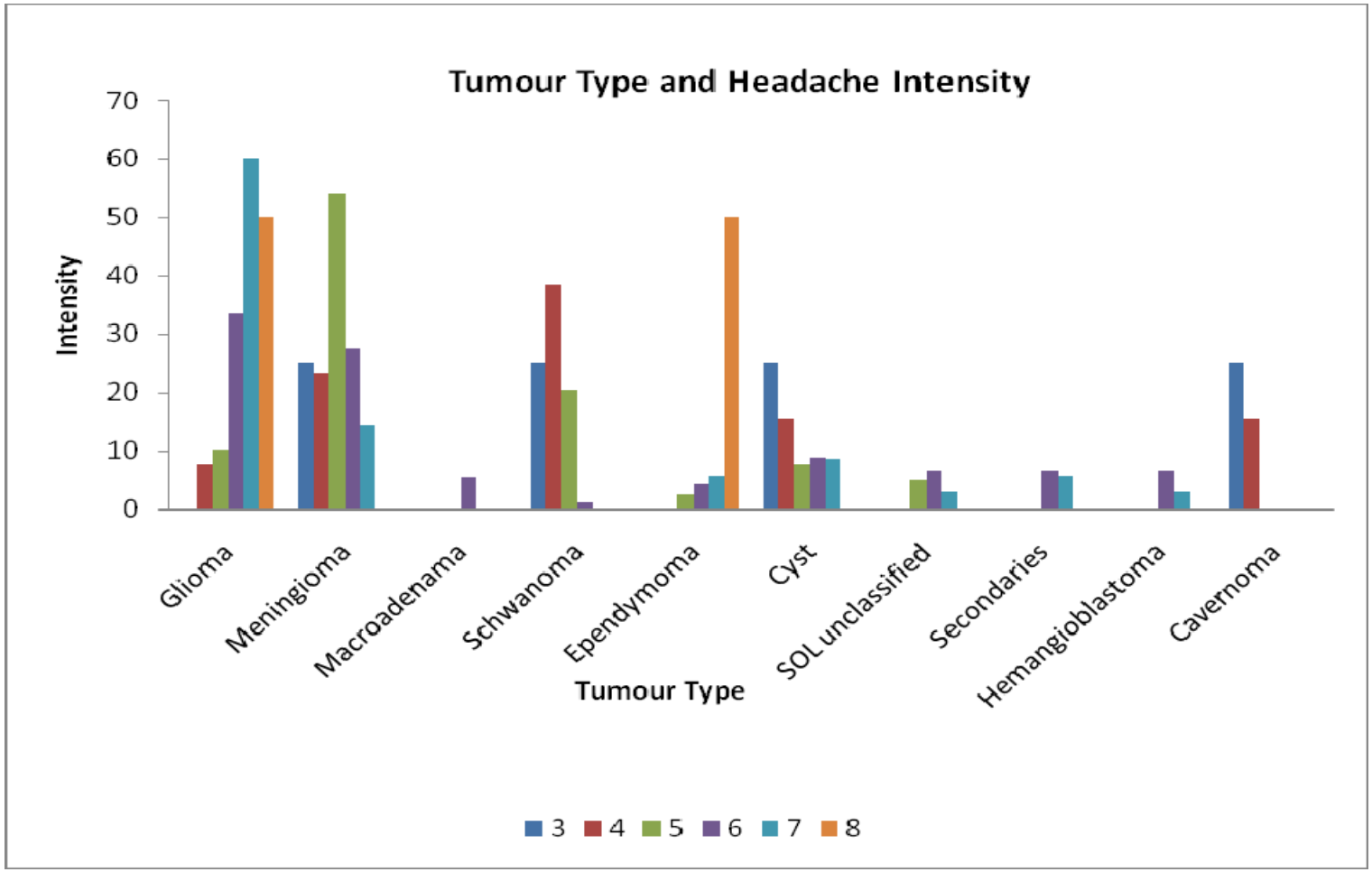
| Intensity of HA | | ICT features | | Total |
|---|---|---|---|---|
| | | Yes | No | |
| 3 | Count | 0 | 4 | 4 |
| | % within intensity | .0% | 100.0% | 100.0% |
| | % within ICT features | .0% | 4.1% | 2.2% |

| | | | | |
|---|---|---|---|---|
| 4 | Count | 2 | 11 | 13 |
| | % within intensity | 15.4% | 84.6% | 100.0% |
| | % within ICT features | 2.3% | 11.3% | 7.1% |
| 5 | Count | 9 | 30 | 39 |
| | % within intensit | 23.1% | 76.9% | 100.0% |
| | % within ICT features | 10.3% | 30.9% | 21.2% |
| 6 | Count | 45 | 46 | 91 |
| | % within intensity | 49.5% | 50.5% | 100.0% |
| | % within ICT features | 51.7% | 47.4% | 49.5% |
| 7 | Count | 29 | 6 | 35 |
| | % within intensity | 82.9% | 17.1% | 100.0% |
| | % within ICT features | 33.3% | 6.2% | 19.0% |
| 8 | Count | 2 | 0 | 2 |
| | % within intensity | 100.0% | .0% | 100.0% |
| | % within ICT features | 2.3% | .0% | 1.1% |
| | Count | 87 | 97 | 184 |
| | % within intensity | 47.3% | 52.7% | 100.0% |
| | % within ICT features | 100.0% | 100.0% | 100.0% |

More percentage of patients in the raised ICP group (87.3%) had more intensity headaches( intensity scaling of 6 and more) than patients in the normal ICP group (53.6).

**Type of tumour and ICT**

| | | **ICT features** | | **Total** |
|---|---|---|---|---|
| | | Yes | No | |
| Glioma | Count | 45 | 13 | 58 |
| | % within Nature of tumour | 77.6% | 22.4% | 100.0% |
| | % within ICT features | 50.6% | 10.9% | 27.9% |
| Meningioma | Count | 11 | 44 | 55 |
| | % within Nature of tumour | 20.0% | 80.0% | 100.0% |
| | % within ICT features | 12.4% | 37.0% | 26.4% |
| Macroadenoma | Count | 0 | 8 | 8 |
| | % within Nature of | .0% | 100.0% | 100.0% |


Tumour Type and Headache Intensity
Intensity
70
60
50
40
30
20
10
0
Glioma
Meningioma
Macroadenama
Schwanoma
Ependymoma
Cyst
SOL unclassified
Secondaries
Hemangioblastoma
Cavernoma
Tumour Type
3
4
5
6
7
8

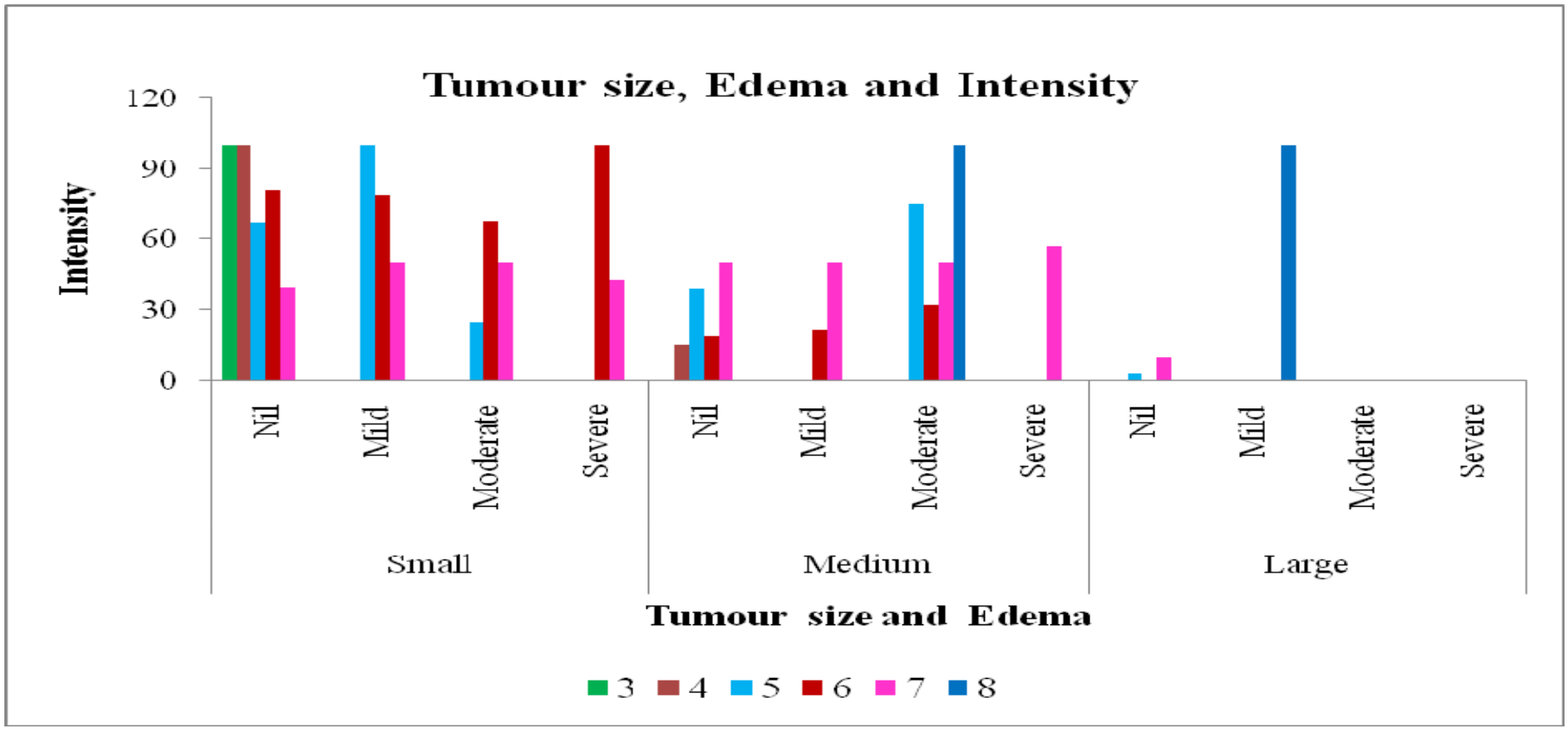
| | | | | |
|---|---|---|---|---|
| | tumour | | | |
| | % within ICT features | .0% | 6.7% | 3.8% |
| Schwanoma | Count | 3 | 25 | 28 |
| | % within Nature of tumour | 10.7% | 89.3% | 100.0% |
| | % within ICT features | 3.4% | 21.0% | 13.5% |
| Ependymoma | Count | 7 | 1 | 8 |
| | % within Nature of tumour | 87.5% | 12.5% | 100.0% |
| | % within ICT features | 7.9% | .8% | 3.8% |
| Cyst | Count | 11 | 8 | 19 |
| | % within Nature of tumour | 57.9% | 42.1% | 100.0% |
| | % within ICT features | 12.4% | 6.7% | 9.1% |
| SOL | Count | 3 | 7 | 10 |
| | % within Nature of tumour | 30.0% | 70.0% | 100.0% |
| | % within ICT features | 3.4% | 5.9% | 4.8% |
| Secondary | Count | 2 | 9 | 11 |
| | % within Nature of tumour | 18.2% | 81.8% | 100.0% |
| | % within ICT features | 2.2% | 7.6% | 5.3% |
| Heamangioblastoma | Count | 7 | 0 | 7 |
| | % within Nature of tumour | 100.0% | .0% | 100.0% |
| | % within ICT features | 7.9% | .0% | 3.4% |
| Cavernoma | Count | 0 | 4 | 4 |
| | % within Nature of tumour | .0% | 100.0% | 100.0% |
| | % within ICT features | .0% | 3.4% | 1.9% |
| | Count | 89 | 119 | 208 |
| | % within Nature of tumour | 42.8% | 57.2% | 100.0% |
| | % within ICT features | 100.0% | 100.0% | 100.0% |

ICT is more commonly seen with glioma( 50.6)%, ventricular tumours like ependymomas, colloid cyst of ventricles(20.3%). These associations are significant ( p value = 0.000).

**Size of the tumour in in Sq cm and Tumour edema and Headache intensity :**

| intensity | | | | Edema | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | Nil | Mild | Moderate | Severe | |
| 3 | Size in Sq cm | Small | Count | 4 | | | | 4 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 100.0% | | | | 100.0% |
| | Total | | Count | 4 | | | | 4 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 100.0% | | | | 100.0% |
| 4 | Size in Sq cm | Small | Count | 11 | | | | 11 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 84.6% | | | | 84.6% |
| | | Medium | Count | 2 | | | | 2 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 15.4% | | | | 15.4% |
| | Total | | Count | 13 | | | | 13 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 100.0% | | | | 100.0% |
| 5 | Size in Sq cm | Small | Count | 19 | 2 | 1 | | 22 |
| | | | % within Size in Sq cm | 86.4% | 9.1% | 4.5% | | 100.0% |
| | | | % within Edema | 57.6% | 100.0% | 25.0% | | 56.4% |
| | | Medium | Count | 13 | 0 | 3 | | 16 |
| | | | % within Size in Sq cm | 81.3% | .0% | 18.8% | | 100.0% |
| | | | % within Edema | 39.4% | .0% | 75.0% | | 41.0% |
| | | Large | Count | 1 | 0 | 0 | | 1 |
| | | | % within Size in Sq cm | 100.0% | .0% | .0% | | 100.0% |
| | | | % within Edema | 3.0% | .0% | .0% | | 2.6% |
| | Total | | Count | 33 | 2 | 4 | | 39 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | % within Size in Sq cm | 84.6% | 5.1% | 10.3% | | 100.0% |
| | | | % within Edema | 100.0% | 100.0% | 100.0% | | 100.0% |
| 6 | Size in Sq cm | Small | Count | 39 | 11 | 19 | 1 | 70 |
| | | | % within Size in Sq cm | 55.7% | 15.7% | 27.1% | 1.4% | 100.0% |
| | | | % within Edema | 81.3% | 78.6% | 67.9% | 100.0% | 76.9% |
| | | Medium | Count | 9 | 3 | 9 | 0 | 21 |
| | | | % within Size in Sq cm | 42.9% | 14.3% | 42.9% | .0% | 100.0% |
| | | | % within Edema | 18.8% | 21.4% | 32.1% | .0% | 23.1% |
| | Total | | Count | 48 | 14 | 28 | 1 | 91 |
| | | | % within Size in Sq cm | 52.7% | 15.4% | 30.8% | 1.1% | 100.0% |
| | | | % within Edema | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 7 | Size in Sq cm | Small | Count | 4 | 2 | 7 | 3 | 16 |
| | | | % within Size in Sq cm | 25.0% | 12.5% | 43.8% | 18.8% | 100.0% |
| | | | % within Edema | 40.0% | 50.0% | 50.0% | 42.9% | 45.7% |
| | | Medium | Count | 5 | 2 | 7 | 4 | 18 |
| | | | % within Size in Sq cm | 27.8% | 11.1% | 38.9% | 22.2% | 100.0% |
| | | | % within Edema | 50.0% | 50.0% | 50.0% | 57.1% | 51.4% |
| | | Large | Count | 1 | 0 | 0 | 0 | 1 |
| | | | % within Size in Sq cm | 100.0% | .0% | .0% | .0% | 100.0% |
| | | | % within Edema | 10.0% | .0% | .0% | .0% | 2.9% |
| | Total | | Count | 10 | 4 | 14 | 7 | 35 |
| | | | % within Size in Sq cm | 28.6% | 11.4% | 40.0% | 20.0% | 100.0% |
| | | | % within Edema | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| 8 | Size in Sq cm | Medium | Count | | 0 | 1 | | 1 |
| | | | % within Size in Sq cm | | .0% | 100.0% | | 100.0% |
| | | | % within Edema | | .0% | 100.0% | | 50.0% |
| | | Large | Count | | 1 | 0 | | 1 |
| | | | % within Size in Sq cm | | 100.0% | .0% | | 100.0% |
| | | | % within Edema | | 100.0% | .0% | | 50.0% |
| | Total | | Count | | 1 | 1 | | 2 |
| | | | % within Size in Sq cm | | 50.0% | 50.0% | | 100.0% |
| | | | % within Edema | | 100.0% | 100.0% | | 100.0% |


Tumour size, Edema and Intensity
Intensity
120
90
60
30
0
Nil
Mild
Moderate
Severe
Nil
Mild
Moderate
Severe
Nil
Mild
Moderate
Severe
Small
Medium
Large
Tumour size and Edema
3
4
5
6
7
8

**Correlations**

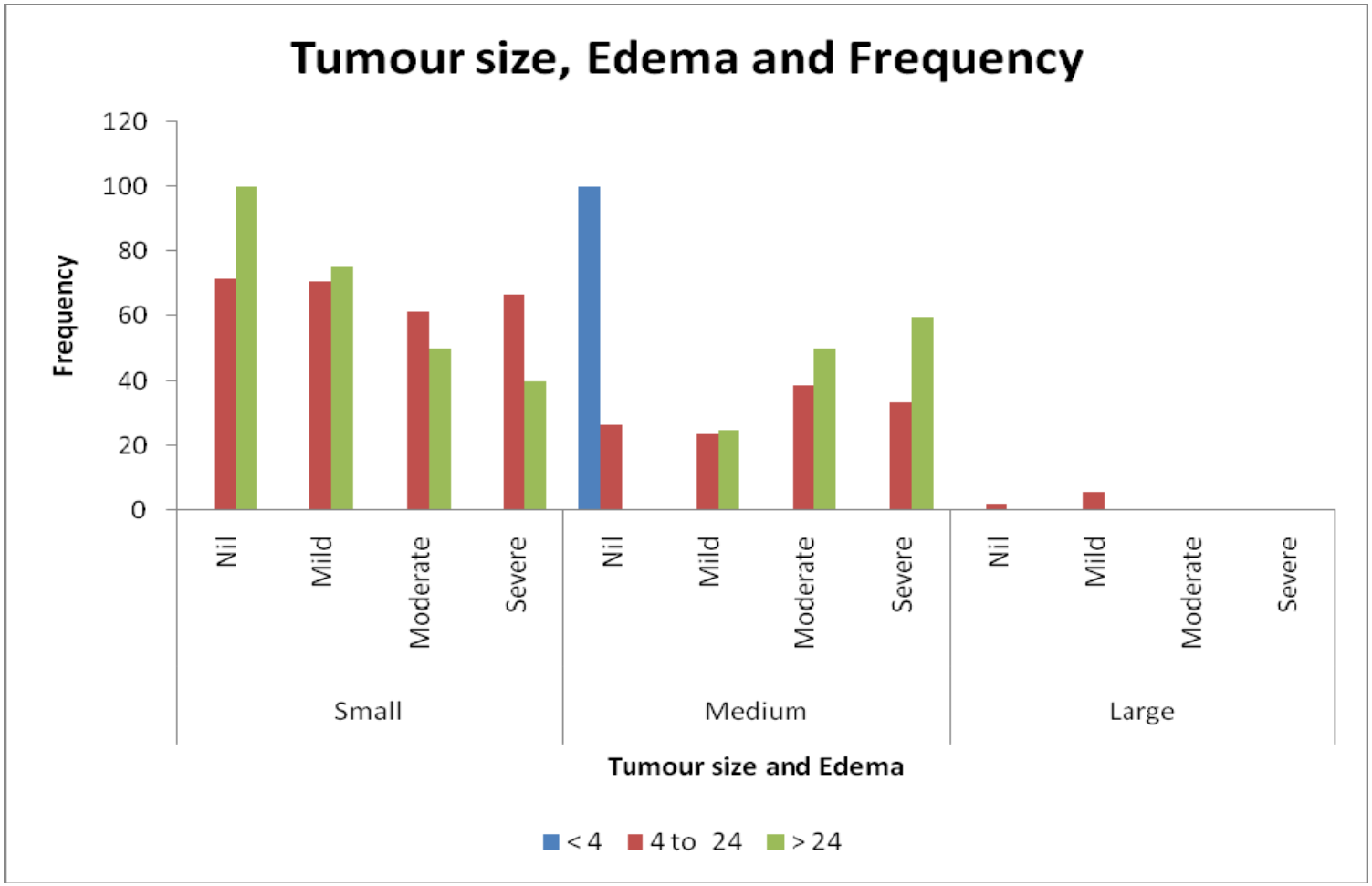
| | | size | Edema | intensity |
|---|---|---|---|---|
| Size | Pearson Correlation | 1 | .098 | .194(**) |
| | Sig. (2-tailed) | . | .158 | .008 |
| | N | 208 | 208 | 184 |
| Edema | Pearson Correlation | .098 | 1 | .460(**) |
| | Sig. (2-tailed) | .158 | . | .000 |
| | N | 208 | 208 | 184 |
| intensit | Pearson Correlation | .194(**) | .460(**) | 1 |
| | Sig. (2-tailed) | .008 | .000 | . |
| | N | 184 | 184 | 184 |

** Correlation is significant at the 0.01 level (2-tailed).

This shows that even smaller sized tumours with edema have more intense headache than large tumours without edema. These associations are significant (p value 0.01).

**Relation between Size of the tumour, its edema and the frequency of episodes:**

| Frequency of episodes ( per month) | | | | Edema | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | Nil | Mild | Moderate | Severe | |
| Upto 4 | Size in Sq cm | Medium | Count | 1 | | | | 1 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 100.0% | | | | 100.0% |
| | Total | | Count | 1 | | | | 1 |
| | | | % within Size in Sq cm | 100.0% | | | | 100.0% |
| | | | % within Edema | 100.0% | | | | 100.0% |
| 5-24 | Size in Sq cm | Small | Count | 75 | 12 | 19 | 2 | 108 |


Tumour size, Edema and Frequency
Frequency
120
100
80
60
40
20
0
Nil
Mild
Moderate
Severe
Nil
Mild
Moderate
Severe
Nil
Mild
Moderate
Severe
Small
Medium
Large
Tumour size and Edema
< 4
4 to 24
> 24

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | % within Size in Sq cm | 69.4% | 11.1% | 17.6% | 1.9% | 100.0% |
| | | | % within Edema | 71.4% | 70.6% | 61.3% | 66.7% | 69.2% |
| | | Medium | Count | 28 | 4 | 12 | 1 | 45 |
| | | | % within Size in Sq cm | 62.2% | 8.9% | 26.7% | 2.2% | 100.0% |
| | | | % within Edema | 26.7% | 23.5% | 38.7% | 33.3% | 28.8% |
| | | Large | Count | 2 | 1 | 0 | 0 | 3 |
| | | | % within Size in Sq cm | 66.7% | 33.3% | .0% | .0% | 100.0% |
| | | | % within Edema | 1.9% | 5.9% | .0% | .0% | 1.9% |
| | Total | | Count | 105 | 17 | 31 | 3 | 156 |
| | | | % within Size in Sq cm | 67.3% | 10.9% | 19.9% | 1.9% | 100.0% |
| | | | % within Edema | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Above 24 | Size in Sq cm | Small | Count | 2 | 3 | 8 | 2 | 15 |
| | | | % within Size in Sq cm | 13.3% | 20.0% | 53.3% | 13.3% | 100.0% |
| | | | % within Edema | 100.0% | 75.0% | 50.0% | 40.0% | 55.6% |
| | | Medium | Count | 0 | 1 | 8 | 3 | 12 |
| | | | % within Size in Sq cm | .0% | 8.3% | 66.7% | 25.0% | 100.0% |
| | | | % within Edema | .0% | 25.0% | 50.0% | 60.0% | 44.4% |
| | Total | | Count | 2 | 4 | 16 | 5 | 27 |
| | | | % within Size in Sq cm | 7.4% | 14.8% | 59.3% | 18.5% | 100.0% |
| | | | % within Edema | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

## Correlations:

| | | Size | Edema | Frequency |
|---|---|---|---|---|
| Size | Pearson Correlation | 1 | .098 | .057 |
| | Sig. (2-tailed) | . | .158 | .441 |
| | N | 208 | 208 | 184 |
| Edema | Pearson Correlation | .098 | 1 | .582(**) |
| | Sig. (2-tailed) | .158 | . | .000 |
| | N | 208 | 208 | 184 |
| Frequency | Pearson Correlation | .057 | .582(**) | 1 |
| | Sig. (2-tailed) | .441 | .000 | . |
| | N | 184 | 184 | 184 |

With respect to frequency of the episodes per month, the extent of edema plays a significant role. This relationship is statistically significant p value (0.000).

# DISCUSSION

The age of the study population of 208 patients consisting of 52.4% male and 47.6% female patients ranged between 13 years to 85 years. The median age was 41. All the patients in the study population could not be complied with the ICHD-II 7.4 definition of Headache attributable to intracranial neoplasms. Hence, this study is an analysis of the pattern of headache prevailing in patients with brain tumours . The study has a limitation that it was carried out in the patients attending neuro department of a small referral centre .

The prevalence of headache in the present study was 88.5%. (47.11% males and 46.35% females).They had headache since the beginning or during the course of illness. 11.5 % ( 5.29% males and 6.25% females) did not have headache during the course of illness till the time of interview. But previous studies have shown 48%( Forsyth and Posner 1993 [12]), 58.8% ( Pfund et al 1999 [11]), 60% ( Schankin et al 2007[9]), 47.6% (Valentinis et al 2010 [13]).

Regarding the type of tumours, gliomas( 30.9%) and meningiomas (29.8%) were the most common in the headache group. In the headache absent group of patients, vestibular schwanomas (54.2%) were most

commonly seen in this study. But pfund et al [11] in their study had stated that in the headache group the most frequent findings were metastatic brain tumors and different astrocytomas. Hypophysis adenomas and glioblastoma multiforme were frequent in the no-headache group.

**Location of headache and progression:**

Regarding location of headache, 66.3 % had onset in the fronto parietal and 22.1 % had occipital .

During onset, in patients with tumours in the supratentorial hemispheric region in frontal, parietal , temporal or occipital lobe or frontoparietal or temporoparietal, headache was localized to the tumour side during onset and later became generalized. In 2.7% Headache had remained unilateral during the entire episode. The side of onset 51.6% had onset in left side ipsilateral to the tumour, 27.2 % had to right side ipsilateral to the tumour, 21.2 % had bilateral headaches.

In tumours near midline like pitutary tumours, headache was bi frontoparietal. In ventricular tumours and in other infra temporal tumours with associated hydrocephalus and raised intracranial pressure, it was bi frontoparietal during onset. In infratentorial tumours it was in occipital region during onset. These are due to region based stimulation and

refered pain in the trigrminal nerve distribution in supratentorial or cervical nerve distribution in infratentorial tumours. These associations although corresponding to the location of tumour were not significant statistically ( Left side p= 0.000, bilateral p value=0.000, right side p value=0.417) for all these location of onset of headache.

These observations are consistent with previous study. Forsyth and Posner et al.,[12] who had stated that patients with unilateral headache had an ipsilateral tumor. Most patients with infratentorial tumors have supratentorial headaches only; but if occipital pain is present, an infratentorial tumor is more likely (pfund et al [11]). Headache has lateralizing value, especially in patients with supratentorial lesions who have no obvious increased intracranial pressure (Suwanwela et al 1994 [20]) . Infratentorial tumours were found to be significantly more often associated with occipital and less often with frontal headache. If headache was unilateral, then headache and tumour were on the same side in only 61.5% (Schankin et al [9] )But in contrast, other previous studies had stated headache lateralization predicted tumor location in only one third of patients (pfund et al 1999 [11)], Frontal headaches were the most unreliable in predicting tumor location and were most common ( Valentinis et al 2010 [13]).

**Pattern of headache:**

All the patients in the headache group had intermittent pattern of headache with varying frequency of episodes of vary,most (47.1%) of the patients had about 12 days a month and each episode lasting between 4-24 hours. This is consistent with pfund et al [11] and Suwanwela et al [20] who has stated that the headache was never permanent and there was no regular daily recurrence.

The duration of headache in recent onset headache ranged between 1 to 7 months. More of supratentorial tumours had headache of relatively longer duration than infratentorial location. This is statistically significant ( p= 0.018).

**Quality of headache:**

In this study 86.1 % had dull aching type of pain and 2.7 % had band like pain. This is consistent with Forsyth posner [12,] pfund etal [11], Schankin et al [9] and suwanwela etal [20].

49.5 % had headache intensity under nominal analogue scaling of 6 and 19 % had scaling of 7 and 21.2 % had scaling of 5. 9.3 % had scaling less than 5, suggesting that brain tumour associated headache is a moderate to severe intensity type which is consistent with previous

studies (Forsyth and Posner [12]; Pfund et al [11] ; Schankin et al [9]; Valentinis et al [13]). All the patients required analgesics for relieving their headache, some patients with tumour associated edema were benefitted from steroids.

**Associated symptoms and aggravating associations :**

All the patients ( 100 % ) in the headache group did not have photo phobia or phonophobia . 31 % in the headache group had associated nausea and vomiting. 43 % of the patients had headache worsening with cough, 16.3 % had headache worsening with bending down, 12 % had worsening during strain, 10.3 % had early morning headache. 40.8 % had focal neurological signs and 23.3 % had seizures .These observations are consistent with previous studies that nausea and vomiting are reported in 18% to 60%, 20% report headache exacerbation by Valsalva maneuvers, about a third of patients have nocturnal or morning headaches or both .(Forsyth and Posner [12]; Pfund et al [11]; Schankin et al [9]; Valentinis et al [13]).

42.8 % had features of raised intra cranial tension. All the patients in the headache absent group with tumour did not have raised intracranial pressure. This suggests that intracranial pressure is one of the important factor in the manifestation of headache.

Among patients with raised intracranial pressure, 41.9 % were of supratentorial and 45% were of infratentorial in location, implying that more of infratentorial tumours present with raised intracranial pressure. This association was not statistically significant (p value 0.4). Previous studies have stated that posterior fossa tumor causes headache more often than a supratentorial tumor (Purdy RA, Kirby S [14] ).

Isolated headache as the symptom was observed in 17.9 % of the patients having headache. Previous studies have mentioned that fifteen patients (8%) exhibited headache as their first and isolated clinical manifestation and posterior fossa location and hydrocephalus were more frequent in patients who presented with headache as the first symptom (Vázquez-Barquero etal [19] ) and pain was the first compliant in half of the patients ( pfund et al [11]) .

**Type of the tumour and intensity of headache:**

More of greater intensity headaches are seen with gliomas, meningioma, and tumours that have caused raised intracranial pressure. The corelation is statistically significant ( p value 0.000).These are consistent with previous studies (Shankin et al [9]). With pituitary macroadenomas, both small and medium sized tumours have caused moderate intensity headache. These observations are consistent with

previous studies that pituitary volume and the presenting phenotype is likely to be governed by a combination of factors, including tumour activity, relationship to the cavernous sinus and patient predisposition to headache ( Levy et al [17]).

**Size of the tumour and intensity of headache:**

Most of medium and large size tumours have produced more intense headaches when compared with the small sized tumours which have produced milder forms of headache. As certain small sized tumours have also produced more intense headaches, probably some other factors like edema may also be contributing to the intensity of the headache, suggesting that size of the tumour is one of the factor requiring modification by other factors like edema, development of raised ICP, vascular or meningeal involvement, etc. in determining the headache intensity. The intensity of the headache has association with the size of the tumour which is significant (p=0.000). Valentinis et al 2010 [13] have stated that within similar pathologies, increased size was associated with increased risk of headache, but others studies (Pfund et al 1999 [11]; Levy et al 2004b [17]; Schankin et al 2007 [9];) have not shown this association.

**Tumour associated edema and intensity of headache:**

More number of patients with mild, moderate and severe edema had more intense headaches than patients with no edema. More of the patients without edema were associated with milder intensity headaches. As mild and no edema group were also associated with more intense headaches, probably due to other associated factors and mechanisms in the causation of headache. The intensity of the headache association with the extent of edema due to tumour is significant (p=0.000)

**Intensity and Intracranial pressure:**

Intense headaches of scaling 6 and more were seen in with more number of patients with raised Intracranial pressure group than in patients without raised Intracranial pressure.

**Type of tumour and Intracranial pressure:**

Intracranial pressure is more commonly seen with gliomas, ventricular tumours like ependymomas, colloid cyst of ventricles . These associations are significant ( p value = 0.000).

**Size of the tumour in in Sq cm and Tumour edema and Headache intensity:**

This shows that even smaller sized tumours with edema have more intense headache than large tumours without edema illustrating that edema is an important factor in determining the intensity of the headache. The size of the tumour and edema are important associated factors in determining the intensity along with other factors. Among them edema is more significant .This is statistically significant (p value 0.01).

**Size of the tumour, its edema and the frequency of episodes:**

The frequency of episodes were less in the mild edema group and more in the severe edema group. Even large sized tumours have caused lesser frequency of episodes. Hence with regard to frequency of the episodes per month, the extent of edema plays a significant role. This association is statistically significant ( p value 0.000).

Factors that predict increased risk of headache in patients with brain tumor include infratentorial location, raised intracranial pressure, degree of midline shift, and increasing edema (Forsyth and Posner 1993 [12]; Pfund et al 1999 [11]). The relationship between tumor size and the

likelihood of headache is uncertain. Similar to the findings of Forsyth and Posner, Valentinis etal [13] found that within similar pathologies, increased size was associated with increased risk of headache, but others did not have similar findings (Pfund et al [11] ; Levy et al [17]; Schankin et al [9]; Valentinis et al [13]).

**Pre-existing headache:**

All the patients with pre existing headache had increased frequency, duration and headache quality of episodes without much alteration in the intensity or location of headache. One patient (12.5%) continued to have the same pattern of headache .These observations were consistent with previous studies (Schankin et al [9]).

While attempting to classify these headache pattern under primary headache types, the criteria for tension type of headache was met in 67 patients (36.4%) and for other types in none, consistent with previous studies, report that it was of tension type in 32 % and none in other types (schankin et al [9] , Valentinis et al 2010 [13]).

In general, brain tumour headaches in contrast to primary headaches are of more of unilateral during onset, dull aching type of pain, recent onset or change in pattern with pre-existing headache,

progressive in nature, worsening with valsalva, change in position or exertion, associated with seizures or neurological signs.

Eventhough only a small minority of patients with headache have brain tumor as the cause, it is crucial to recognize those headache characteristics that are associated with tumors. Because of the variable nature of headache among patients with brain tumor, the diagnosis of headache attributed to brain tumor should be considered in patients who complain of a headache with any of the following "red flags":

- Acute, new, usually severe headache or headache that has changed from previous patterns
- New headache onset in an adult, especially over 50 years of age
- Headache in the elderly or in children
- Headache on exertion, onset at night, or onset at early morning
- Headache that is progressive in nature
- Headache associated with fever or other systemic symptoms
- Headache with meningismus
- Headache with new neurologic signs
- Precipitation of head pain with the Valsalva maneuver (by coughing, sneezing, or bending over)

In patients with any of the above features, further investigation with neuroimaging is warranted.

# SUMMARY

An observational study analyzing the pattern of headache in 208 patients with brain tumor.

The prevalence of headache was 88.5%.

During onset, supratentorial tumours had ipsilateral frontoparietal localization, pituitary tumours and tumours causing raised intracranial pressure had bilateral and infratentorial tumours without raised ICP to occipital localization. All these later had become generalized.

Recent onset headache having intermittent pattern of mostly dull aching nature or occasionally band like, of moderate to severe intensity (70 % ).

31% had associated vomiting, 43 % had worsening with coughing,16.3 % had worsening with bending down, 12 % had worsening during strain, 10.3 % had early morning headache.

40.8 % had focal neurological sings and 23.3 % had seizures. Isolated headache as the symptom was observed in 17.9 % of the patients having headache.

3.8 % had pre existing headache, of them 87.5 % of patients had increased frequency, duration and headache quality of episodes without much alteration in the intensity or location of headache.

The criteria for tension type of headache was met in 67 patients (36.4% ) and for other types in none in these patients with secondary brain tumour headache.

More greater intensity headaches were seen with gliomas, meningioma, and tumours that has caused raised intracranial pressure.

The size of the tumour is one of the factor requiring modification by other factors like edema, development of raised ICP, vascular or meningeal involvement, etc. in determining the headache.

The intensity of the headache significantly correlates with the extent of edema due to the tumour.

Intense headaches of scaling 6 and more were seen in with more number of patients with raised Intracranial pressure group than in patients without raised Intracranial pressure.

Intracranial pressure is more commonly seen with gliomas, ventricular tumours like ependymomas, colloid cyst of ventricles.

The size of the tumour has a role, requiring other modifying factors in causing headache.

The extent of edema plays a significant role with regard to frequency of the episodes per month.

Factors that predicting increased risk of headache in patients with brain tumour are infratentorial location , raised intracranial pressure, degree of midline shift, and increasing edema .

Headache attributed to brain tumor should be considered, requiring neuro imaging, in patients who complain of a headache with any of the "red flags":

# CONCLUSION

This study concludes that the clinical profile of brain tumour associated headaches are having the special characteristics features of unilaterality , dull ache, recent onset or change in pattern with pre existing headache, progressive in nature, headache intensity worsening with valsalva, change in position or during exertion and in association with seizures or neurological deficits. The extent of tumour associated edema, and raised intracranial pressure are significantly important factors in tumour associated headache.

Based on these special characteristic features, the study states that even if the headache does not have all the characteristic features, presence of any one or more of the above mentioned features should prompt suspicion of intracranial space occupying lesion and should be investigated with neuroimaging for early diagnostic and therapeutic intervention.

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# The Temporal Profile of Space occupying lesion of brain headache

## Proforma

Name: Age: sex: OP/ IP no:

address:

History:

Headache

Duration:

Intermittent/ continuous,

Intermittent: Frequency: days/ month

Episode duration: Less than 4 hrs/ 4- 24 hrs/ more than 24 hrs

side of onset: Right/ left/ Bilateral

Progression: whether it becomes bilateral generalilsed or remains unilateral

intensity (NAS scaling from 1 to 10 :

with 1 for little and 10 for worst pain]

quality of pain (dull, stinging, pulsating, tightening or band like,others )

Associated phenomenon during the episode-
Nausea and vomiting :

Photophobia , phonophobia, lacrimation

Worsening with coughing, exercise , bending down

Any early morning worse headache with awakening

Any H/o seizures associated :

Whether requiring medications for relieving headache and nature of medications used:

Other neurological symptoms:

Other system symptoms:

Examination:

Higher Function:

Cranial .Nerve : Fundus:

Motor:

Sensory:

Coordination

Spine and cranium:

Investigations

Routine:

Endocrine:

Neuro Imaging details:

Location:

Probable type:

Tumour size  approximate in two dimensions( in $cm^2$ ) :

Associated edema : (scaling of 0-3 from no oedema (0) to extensive oedema (3))

Biopsy of the tumour:

Other investigations:.

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21 | 1 | 2 | 11 | 6 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 2 | 39 | 1 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 12 | 2 | 0 |
| 3 | 20 | 1 | 3 | 4 | 1 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 0 |
| 4 | 45 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 13 | 2 | 3 |
| 5 | 28 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 10 | 2 | 1 | 1 | 1 | 1 | 4 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 20 | 2 | 0 |
| 6 | 45 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 16 | 2 | 0 |
| 7 | 33 | 2 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 20 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 12 | 2 | 2 |
| 8 | 14 | 2 | 3 | 6 | 1 | 1 | 2 | 2 | 2 | 6 | 1 | 30 | 3 | 3 | 2 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 8 | 1 | 2 |
| 9 | 46 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 5 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 8 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 12 | 2 | 2 |
| 10 | 24 | 1 | 3 | 7 | 5 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 30 | 3 | 0 |
| 11 | 21 | 2 | 1 | 5 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 12 | 49 | 1 | 2 | 8 | 7 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 1 | 0 |
| 13 | 67 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 1 | 0 |
| 14 | 16 | 1 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 15 | 45 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 16 | 2 | 2 |
| 16 | 40 | 1 | 1 | 6 | 6 | 1 | 2 | 2 | 2 | 7 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 6 | 1 | 0 |
| 17 | 23 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 8 | 2 | 1 | 1 | 2 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 12 | 2 | 0 |
| 18 | 15 | 1 | 3 | 2 | 10 | 1 | 1 | 2 | 2 | 4 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 6 | 1 | 0 |
| 19 | 47 | 1 | 2 | 8 | 7 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 1 | 0 |
| 20 | 40 | 1 | 1 | 3 | 10 | 1 | 1 | 2 | 2 | 5 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 21 | 42 | 1 | 1 | 4 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 12 | 2 | 0 |
| 22 | 52 | 1 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 2 | 1 | 8 | 2 | 3 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 6 | 1 | 0 |
| 23 | 50 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 8 | 1 | 2 |
| 24 | 50 | 1 | 3 | 6 | 4 | 2 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 6 | 1 | 0 |
| 25 | 50 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 26 | 44 | 1 | 1 | 6 | 4 | 2 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 27 | 58 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 9 | 1 | 0 |
| 28 | 59 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 1 | 1 | 2 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 29 | 28 | 1 | 1 | 6 | 6 | 1 | 2 | 2 | 2 | 5 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 6 | 1 | 0 |
| 30 | 16 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 8 | 1 | 3 |
| 31 | 42 | 1 | 2 | 7 | 5 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 0 |
| 32 | 46 | 1 | 1 | 3 | 8 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 8 | 1 | 1 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 28 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 6 | 1 | 3 |
| 34 | 42 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 6 | 1 | 0 |
| 35 | 50 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 8 | 1 | 2 |
| 36 | 35 | 1 | 1 | 6 | 9 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 6 | 1 | 1 |
| 37 | 30 | 1 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 38 | 40 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 6 | 1 | 2 |
| 39 | 70 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 6 | 1 | 2 |
| 40 | 65 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 6 | 1 | 2 |
| 41 | 34 | 1 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 42 | 30 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 6 | 1 | 2 |
| 43 | 24 | 1 | 2 | 7 | 6 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 0 |
| 44 | 52 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 45 | 58 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 30 | 3 | 2 | 1 | 1 | 2 | 7 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 2 |
| 46 | 40 | 1 | 1 | 3 | 5 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 6 | 1 | 0 |
| 47 | 50 | 1 | 2 | 8 | 7 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 1 | 0 |
| 48 | 65 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 8 | 1 | 0 |
| 49 | 36 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 50 | 46 | 2 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 10 | 1 | 0 |
| 51 | 70 | 2 | 1 | 9 | 8 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 8 | 1 | 1 |
| 52 | 45 | 2 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 6 | 1 | 0 |
| 53 | 40 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 14 | 2 | 0 |
| 54 | 13 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 7 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 55 | 48 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 6 | 1 | 0 |
| 56 | 36 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 12 | 2 | 2 |
| 57 | 42 | 2 | 1 | 6 | 6 | 1 | 2 | 2 | 2 | 6 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 58 | 45 | 2 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 10 | 1 | 0 |
| 59 | 30 | 2 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 2 |
| 60 | 47 | 2 | 2 | 8 | 7 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 8 | 1 | 0 |
| 61 | 54 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 10 | 1 | 3 |
| 62 | 32 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 2 |
| 63 | 35 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 14 | 2 | 0 |
| 64 | 61 | 2 | 1 | 3 | 8 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 8 | 1 | 1 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | 45 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 8 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 66 | 36 | 2 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 6 | 1 | 0 |
| 67 | 65 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 15 | 2 | 0 |
| 68 | 40 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 69 | 28 | 2 | 2 | 8 | 3 | 1 | 1 | 2 | 1 | 5 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 12 | 2 | 0 |
| 70 | 35 | 2 | 3 | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 8 | 1 | 2 |
| 71 | 32 | 2 | 2 | 7 | 6 | 1 | 1 | 2 | 2 | 5 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 6 | 1 | 0 |
| 72 | 70 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 0 |
| 73 | 42 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 10 | 1 | 0 |
| 74 | 12 | 2 | 3 | 6 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 30 | 3 | 1 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 10 | 1 | 2 |
| 75 | 58 | 2 | 1 | 3 | 8 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 6 | 1 | 1 |
| 76 | 50 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 12 | 2 | 2 |
| 77 | 42 | 2 | 3 | 6 | 7 | 1 | 2 | 2 | 2 | 3 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 7 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 1 |
| 78 | 40 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 79 | 52 | 2 | 3 | 6 | 4 | 2 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 6 | 1 | 0 |
| 80 | 55 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 4 | 1 | 3 | 1 | 1 | 1 | 5 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 16 | 2 | 0 |
| 81 | 45 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 9 | 1 | 0 |
| 82 | 42 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 10 | 1 | 2 |
| 83 | 48 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 4 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 12 | 2 | 0 |
| 84 | 21 | 2 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 10 | 1 | 0 |
| 85 | 45 | 2 | 3 | 3 | 6 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 86 | 85 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 87 | 22 | 2 | 3 | 6 | 6 | 1 | 2 | 2 | 2 | 6 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 6 | 1 | 0 |
| 88 | 57 | 2 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 89 | 53 | 2 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 2 | 2 | 2 | 8 | 1 | 0 |
| 90 | 19 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 3 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 91 | 33 | 2 | 1 | 3 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 8 | 1 | 1 |
| 92 | 53 | 2 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 93 | 32 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 12 | 2 | 2 |
| 94 | 35 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 18 | 2 | 2 |
| 95 | 32 | 2 | 2 | 7 | 5 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 8 | 1 | 0 |
| 96 | 16 | 2 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 3 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 10 | 1 | 0 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 60 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 1 |
| 98 | 18 | 1 | 2 | 11 | 6 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 9 | 1 | 0 |
| 99 | 16 | 1 | 1 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 16 | 2 | 0 |
| 100 | 17 | 1 | 2 | 7 | 5 | 1 | 2 | 2 | 2 | 1 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 1 |
| 101 | 17 | 1 | 3 | 7 | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 8 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 24 | 3 | 1 |
| 102 | 60 | 1 | 3 | 6 | 9 | 1 | 2 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 1 |
| 103 | 53 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 18 | 2 | 0 |
| 104 | 30 | 2 | 1 | 4 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 18 | 2 | 2 |
| 105 | 50 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 1 | 1 | 8 | 2 | 2 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 22 | 3 | 0 |
| 106 | 44 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 2 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 5 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 0 |
| 107 | 60 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 12 | 2 | 2 |
| 108 | 15 | 1 | 1 | 1 | 7 | 2 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 20 | 2 | 1 |
| 109 | 40 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 12 | 2 | 2 |
| 110 | 43 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 111 | 15 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 112 | 46 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 4 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 9 | 1 | 0 |
| 113 | 55 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 1 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 9 | 1 | 0 |
| 114 | 32 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 2 |
| 115 | 35 | 2 | 3 | 10 | 7 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 6 | 1 | 1 |
| 116 | 35 | 2 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 3 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 10 | 1 | 0 |
| 117 | 23 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 4 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 1 | 0 |
| 118 | 39 | 2 | 1 | 5 | 1 | 1 | 1 | 2 | 2 | 5 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 2 | 1 |
| 119 | 40 | 2 | 1 | 6 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 1 |
| 120 | 36 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 8 | 1 | 2 |
| 121 | 24 | 1 | 3 | 7 | 5 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 20 | 2 | 0 |
| 122 | 21 | 2 | 1 | 5 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 0 |
| 123 | 20 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 124 | 53 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 125 | 30 | 1 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 12 | 2 | 0 |
| 126 | 34 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 16 | 2 | 2 |
| 127 | 13 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 128 | 70 | 1 | 3 | 6 | 4 | 1 | 2 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 1 | 0 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 129 | 24 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 130 | 18 | 1 | 1 | 1 | 10 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 8 | 1 | 0 |
| 131 | 53 | 1 | 3 | 6 | 9 | 1 | 2 | 2 | 2 | 3 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 8 | 1 | 1 |
| 132 | 21 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 5 | 1 | 8 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 10 | 1 | 0 |
| 133 | 32 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 9 | 1 | 0 |
| 134 | 60 | 1 | 1 | 6 | 9 | 1 | 2 | 2 | 2 | 2 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 1 |
| 135 | 55 | 1 | 2 | 8 | 3 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 6 | 1 | 0 |
| 136 | 39 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 137 | 55 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 9 | 1 | 2 |
| 138 | 70 | 1 | 2 | 9 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 30 | 3 | 2 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 1 |
| 139 | 24 | 1 | 1 | 1 | 10 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 140 | 22 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 10 | 1 | 0 |
| 141 | 35 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 9 | 1 | 0 |
| 142 | 65 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 143 | 70 | 1 | 3 | 2 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 30 | 3 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 10 | 1 | 1 |
| 144 | 65 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 14 | 2 | 0 |
| 145 | 18 | 2 | 2 | 11 | 7 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 0 |
| 146 | 60 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 30 | 3 | 3 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 12 | 2 | 3 |
| 147 | 45 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 148 | 18 | 2 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 30 | 3 | 2 | 2 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 10 | 1 | 0 |
| 149 | 30 | 2 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 18 | 2 | 2 |
| 150 | 60 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 151 | 75 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 10 | 1 | 2 |
| 152 | 45 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |
| 153 | 16 | 2 | 1 | 10 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 3 |
| 154 | 55 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 155 | 55 | 2 | 3 | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 2 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 0 |
| 156 | 65 | 2 | 2 | 11 | 7 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 2 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 157 | 70 | 2 | 1 | 2 | 8 | 1 | 1 | 2 | 2 | 2 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 12 | 2 | 2 |
| 158 | 45 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 12 | 2 | 3 |
| 159 | 58 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 160 | 15 | 2 | 1 | 6 | 6 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 161 | 55 | 2 | 3 | 10 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 8 | 1 | 2 |
| 162 | 45 | 2 | 1 | 1 | 8 | 1 | 1 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 2 | 1 | 2 | 6 | 1 | 1 |
| 163 | 55 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 164 | 38 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 165 | 53 | 2 | 1 | 6 | 9 | 1 | 2 | 2 | 2 | 5 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 10 | 1 | 1 |
| 166 | 46 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 16 | 2 | 3 | 1 | 1 | 2 | 6 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 12 | 2 | 2 |
| 167 | 40 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 5 | 1 | 12 | 2 | 1 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 10 | 1 | 0 |
| 168 | 27 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 8 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 169 | 60 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 7 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 12 | 2 | 3 |
| 170 | 45 | 1 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 3 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 7 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 9 | 1 | 0 |
| 171 | 30 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 3 | 1 | 2 | 1 | 5 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 16 | 2 | 0 |
| 172 | 15 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 173 | 41 | 1 | 3 | 6 | 9 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 12 | 2 | 1 |
| 174 | 80 | 1 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 15 | 2 | 2 |
| 175 | 67 | 1 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 6 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 12 | 2 | 0 |
| 176 | 60 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 9 | 1 | 2 |
| 177 | 49 | 1 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 10 | 1 | 0 |
| 178 | 35 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 2 | 7 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 10 | 1 | 3 |
| 179 | 32 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 180 | 28 | 1 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 30 | 3 | 2 | 2 | 1 | 1 | 7 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 9 | 1 | 2 |
| 181 | 48 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 9 | 1 | 2 |
| 182 | 65 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 1 |
| 183 | 45 | 1 | 2 | 7 | 5 | 1 | 2 | 2 | 2 | 2 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 10 | 1 | 0 |
| 184 | 32 | 1 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 5 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 8 | 1 | 2 |
| 185 | 26 | 1 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 30 | 3 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 1 | 2 |
| 186 | 34 | 1 | 2 | 11 | 7 | 1 | 1 | 2 | 2 | 2 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 6 | 1 | 0 |
| 187 | 30 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 16 | 2 | 3 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 9 | 1 | 2 |
| 188 | 40 | 2 | 1 | 6 | 9 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 1 |
| 189 | 35 | 2 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 5 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 8 | 1 | 0 |
| 190 | 43 | 2 | 1 | 6 | 4 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 9 | 1 | 0 |
| 191 | 14 | 2 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 30 | 3 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 12 | 2 | 2 |
| 192 | 32 | 2 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |

| Sl.No. | Age | Sex | Side of tumour | Location of Tumour | Type of Tumour | Headache | Tentorial Location | Fam H/O HA | Preexisting HA | Duration | Intermittentt/ Continuous | Frequency | Duratioon of episode | Side of onset of HA | Location of HA | Gen/Unilateral | Quality | Intensity | Vomitting | Photophobia | cough worsening | strain worsening | Early mor HA | posural worsening | ICT features | FND | Seizures | Meication required | Sizi in Sq cm | Size grading | Edema |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 193 | 18 | 2 | 1 | 4 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 7 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 194 | 39 | 2 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 10 | 1 | 2 |
| 195 | 75 | 1 | 1 | 6 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 30 | 3 | 2 | 2 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 9 | 1 | 2 |
| 196 | 58 | 1 | 1 | 3 | 8 | 1 | 1 | 2 | 2 | 1 | 1 | 30 | 3 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 8 | 1 | 2 |
| 197 | 58 | 1 | 1 | 4 | 1 | 1 | 1 | 2 | 2 | 4 | 1 | 12 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 2 |
| 198 | 27 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 7 | 1 | 12 | 2 | 3 | 1 | 2 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 12 | 2 | 0 |
| 199 | 52 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 16 | 2 | 1 | 1 | 1 | 2 | 7 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 20 | 2 | 2 |
| 200 | 60 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 14 | 2 | 2 |
| 201 | 30 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 4 | 1 | 16 | 2 | 1 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 9 | 1 | 2 |
| 202 | 60 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 2 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 203 | 20 | 1 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 3 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 9 | 1 | 0 |
| 204 | 13 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 6 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 10 | 1 | 0 |
| 205 | 50 | 1 | 3 | 6 | 4 | 2 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 9 | 1 | 0 |
| 206 | 45 | 1 | 2 | 7 | 6 | 1 | 2 | 2 | 2 | 4 | 1 | 12 | 2 | 2 | 2 | 1 | 1 | 6 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 10 | 1 | 0 |
| 207 | 13 | 1 | 3 | 1 | 8 | 1 | 1 | 2 | 2 | 3 | 1 | 12 | 2 | 3 | 1 | 1 | 1 | 6 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 8 | 1 | 1 |
| 208 | 53 | 1 | 1 | 6 | 4 | 2 | 2 | 2 | 2 | 0 | #### | ### | #### | #### | ### | ### | #### | #### | ### | ### | ### | ### | ### | ### | ### | 2 | 1 | 2 | 2 | 8 | 1 | 0 |

# MASTER CHART NUMBER CODE REFERENCE

| Number code used | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sex | Male | female | | | | | | | | | |
| Side of tumour | Left | Midline | Right | | | | | | | | |
| Location | Frontal | Frontoparietal | Parietal | Temporal | Occipital | CP angle | Ventricular | Sellar | multiple | Thalamic | pineal |
| Type of tumour | Glioma | Meningioma | Macroadenoma, cranipharyngioma | Schwanoma | Ependymoma | Cyst | SOL unclassified | Secondaries | Haemangioblastoma | Cavernoma | |
| Headache | Present | Absent | | | | | | | | | |
| Tentorial reference | Supra tentorial | infratentoprial | | | | | | | | | |
| Family History | Yes | no | | | | | | | | | |
| Prior headache | Yes | no | | | | | | | | | |
| Duration in months | Same number | | | | | | | | | | |
| Cont or intermittent | Intermittent | continuous | | | | | | | | | |
| Episode frequency (per month) | Same number | | | | | | | | | | |
| Duration of episodes(in hrs) | < 4 hrs | 4 to 24 hrs | >24 hrs | | | | | | | | |
| HA side | Left | Bilateral | right | | | | | | | | |
| HA location | Frontoparietal | Occipital | | | | | | | | | |
| Progression | Generalized | unilateral | | | | | | | | | |
| Quality | Dull | Band like | | | | | | | | | |
| intensity | Corresponding numerical | | | | | | | | | | |
| Nausea vomitting | Yes | no | | | | | | | | | |
| photophobia | Yes | no | | | | | | | | | |
| Worsening with cough | Yes | no | | | | | | | | | |
| Worsening with strain | Yes | no | | | | | | | | | |
| Worsening with posture | Yes | no | | | | | | | | | |
| Early morning headache | Yes | no | | | | | | | | | |
| Raised ICP | Yes | no | | | | | | | | | |
| Focal deficit | Yes | no | | | | | | | | | |
| Seizure | Yes | no | | | | | | | | | |
| Medication requiring | Yes | no | | | | | | | | | |
| Tumour size | <10 $cm^2$ | 10 -20 $cm^2$ | >20 $cm^2$ | | | | | | | | |
| Tumour edema | 0 | 1(mild) | 2(mod) | 3(severe) | | | | | | | |

# INSTITUTIONAL ETHICAL COMMITTEE,
# STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : Temporal profile of space occupying lesion of brain headache

Principal Investigator : Dr.N. Shanmuga Sundaram

Designation : PG in D.M(Neuro)

Department : Department of Neurology
Government Stanley Medical College,
Chennai-1

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 12.10.2011 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate form the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

12/3/12

MEMBER SECRETARY,
IEC, SMC, CHENNAI

# Abstract

The temporal profile of (space occupying lesion of brain) tumour headaches

Introduction:

Given the range of disorders that are implicated in manifesting as headache, an analysis and interpretation of the pattern of headache would be helpful in identifying rarer life threatening secondary headaches. This study is, planned mainly to analyse the pattern of the secondary headaches due to brain neoplasm.

Methods:

All the Patients diagnosed to have primary or secondary brain tumour by neuroimaging were interviewed in detail about the headache. Clinical , neuroimaging and biopsy details were obtained.

Results:

The prevalence of headache in the study population of 208 patients was 88.5 %. Most had a change in the pattern of headache among 3.8 % who had pre existing headache.During onset, Headaches were localized to frontoparietal in supratentorial, and bifronto parietal in sellar and in hydrocephalus , bioccipital in infratentorial tumours and to the same side in hemispheric lesions. 97.3% had dull aching quality. Greater intensity were seen in with more number of patients with raised Intracranial pressure group, with tumor with edema. The frequency of episodes were more in the severe edema group.

Discussion:

The brain tumour associated headache initially has onset in the side of tumour in hemispheric lesions and bifrontal in pitutary tumours and in patients with raised ICP. The common pattern was of intermittent type of moderate intensity with worsening with valsalva and postural change. The size of the tumour is one of the factor requiring modification by other factors like edema, development of raised ICP, vascular or meningeal involvement, etc. in determining the headache. The extent of edema plays a significant role with regard to intensity and frequency of the episodes per month.

Conclusion:

The brain tumour associated headaches have special characteristic features of unilaterality, dull ache, recent onset or change in pattern with pre existing headache, progressive in nature, headache intensity worsening with valsalva, change in position or during exertion and in association with seizures or neurological deficits. The infratentorial location, extent of tumour associated edema, and raised intracranial pressure are significantly important factors in brain tumour associated headache.



Key words: ‘brain tumour’ ‘headache’ ‘brain SOL’